

NASA SP-7011 (28)



AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
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(ACCESSION NUMBER)

217

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during August, 1966



Scientific and Technical Information Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C.

SEPTEMBER 1966

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INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

- a. NASA entries identified by their *STAR* accession numbers (N66-10000 series),
- b. AIAA entries identified by their *IAA* accession numbers (A66-10000 series); and
- c. LC entries identified by a number in the A66-80000 series.

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(continued)

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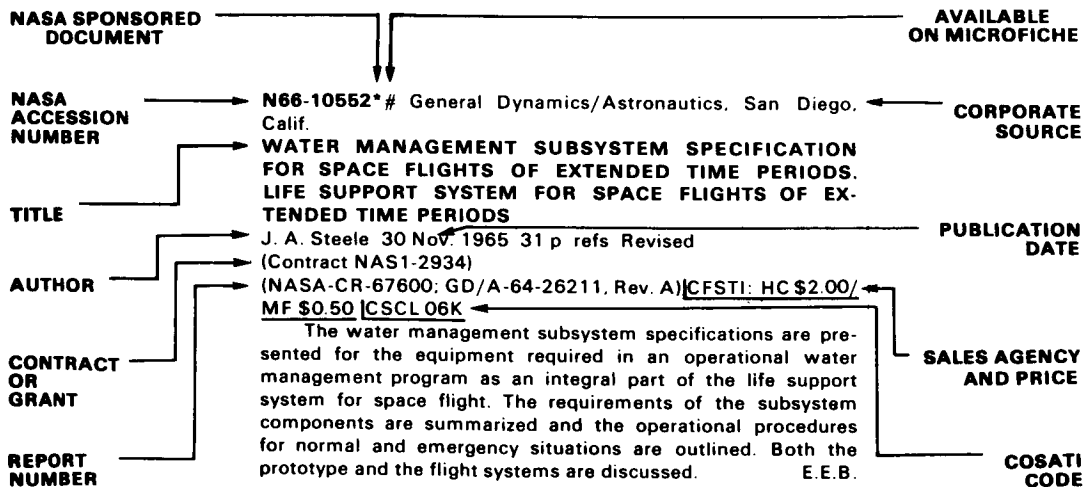
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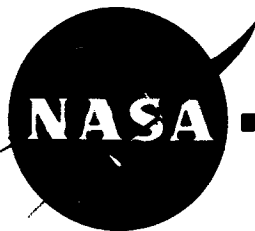
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TYPICAL CITATION AND ABSTRACT





AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography

SEPTEMBER 1966

STAR ENTRIES

N66-26917# Joint Publications Research Service, Washington, D. C.

MODERN TECHNICAL ADVANCES IN MEDICINE

Ye. B. Babitskiy and V. V. Parin, ed. 19 May 1966 161 p refs
Transl. into ENGLISH of "Dostizheniya Sovremennoy Tekhniki v Meditsine" Moscow, Medicine Publishing House, 1965
p 1-172

(JPRS-35611; TT-66-32046) CFSTI: \$4.00

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1. **RADIOTELEMETRIC EQUIPMENT FOR STUDYING PHYSIOLOGICAL PROCESSES IN A FREELY MOVING PERSON** V. V. Rozenblat p 3-36 refs (See N66-26918 15-04)

2. **RADIOTELEMETRIC RESEARCH ON THE FUNCTIONS OF THE DIGESTIVE TRACT** Ye. B. Babitskiy and A. M. Sorin p 37-58 refs (See N66-26919 15-04)

3. **NEW METHODOLOGICAL DIRECTIONS IN ELECTROPHYSIOLOGY** R. M. Meshcherskiy p 59-77 refs (See N66-26920 15-04)

4. **ARTIFICIAL BLOOD CIRCULATION** G. M. Solov'yev p 78-94 (See N66-26921 15-04)

5. **ELECTRONIC MATHEMATICAL MACHINES AND MATHEMATICAL METHODS IN MEDICINE** M. L. Bykhovskiy p 95-109 refs (See N66-26922 15-04)

6. **BIOELECTRIC CONTROL IN CARDIOLOGY** Ye. B. Babitskiy p 110-121 refs (See N66-26923 15-04)

7. **ARTIFICIAL ARMS WITH BIOELECTRIC CONTROL** Ya. S. Yakobson, Ye. P. Polyan, and V. M. Bernshteyn p 122-145 refs (See N66-26924 15-04)

N66-26918# Joint Publications Research Service, Washington, D. C.

RADIOTELEMETRIC EQUIPMENT FOR STUDYING PHYSIOLOGICAL PROCESSES IN A FREELY MOVING PERSON V. V. Rozenblat *In its Mod. Tech. Advan. in Med.* 19 May 1966 p 3-36 refs (See N66-26917 15-04) CFSTI: \$4.00

Three basic types of telemetric systems used to obtain biomedical information are classified according to the positioning of the transmitter and the research organism; that is, the transmitter may be located some distance from the organism under study, on the organism, or within the body

cavity of the subject. The latter two are referred to endoradiosonde and dynamic biotelemetry, respectively; and these in conjunction with so-called onboard telemetry have been combined to obtain data either on space or of interest to space research. State-of-the-art in biotelemetry is reviewed, and various devices are described for studying physiological processes in a freely moving person.

M.W.R.

N66-26919# Joint Publications Research Service, Washington, D. C.

RADIOTELEMETRIC RESEARCH ON THE FUNCTIONS OF THE DIGESTIVE TRACT

Ye. B. Babitskiy and A. M. Sorin *In its Mod. Tech. Advan. in Med.* 19 May 1966 p 37-58 refs (See N66-26917 15-04) CFSTI: \$4.00

Radiotelemetric research is discussed in terms of measurements of the digestive tract processes; and the use of radio pills, called endoradiosondes, is reviewed. These miniature radio transmitters can record changes in hydrogen ion concentrations, pressure, and temperature. Major advantage of their use is that they do not involve damage or to changes in the normal processes of the organism. Endoradiosondes are very mobile and pass along the entire digestive tract, which permits the study of the entire area, but for short periods of time. To permit longer study periods in animals, endoradiosondes have been sewn to the wall of the stomach or intestine; in man, this difficulty because of mobility has not been overcome. Design of these radio pills is discussed, along with their use in making certain recordings.

M.W.R.

N66-26920# Joint Publications Research Service, Washington, D. C.

NEW METHODOLOGICAL DIRECTIONS IN ELECTROPHYSIOLOGY

R. M. Meshcherskiy *In its Mod. Tech. Advan. in Med.* 19 May 1966 p 59-77 refs (See N66-26917 15-04) CFSTI: \$4.00

Stereotaxis and microelectrode research methods in electrophysiology are discussed in terms of applications for the study of the various subcortical formations of the brain and the activity of the individual neurons and their cell bodies, axons, dendrites, and synapses. Both methods are described in detail, and their uses are illustrated. The stereotactic instrument consists of a base to which is attached the head clamp and one or two coordinate micrometric heads. In the latter is the holder which introduces the electrodes into the brain of the experimental animal. Prior to this insertion, a trepanation opening is drilled; and a holding plug of plexiglas is screwed into the opening to attach the electrode to the skull. The gap between the electrode and holding plug is filled with

a rapidly setting lacquer. The positioning of the animal's head, which is anesthetized, is shown. The introduction of micro-electrodes into a living neuron is described, and various problems such as resistance are considered. A scheme of an automatic unit with a tracking system for remote control is shown, as are histograms of neuron discharges obtained by computer processing of data. M.W.R.

N66-26921# Joint Publications Research Service, Washington, D. C.

ARTIFICIAL BLOOD CIRCULATION

G. M. Solov'yev *In its Mod. Tech. Advan. in Med.* 19 May 1966 p 78-94 (See N66-26917 15-04) CFSTI: \$4.00

Design principles for artificial blood circulation equipment are discussed; and details are given for the basic units of such simulated systems, the pumps and oxygenators. The role of hypothermy when combined with artificial blood circulation is considered in terms of developments in open heart surgery requiring lengthy operating periods. Attention is given to a method for cooling a patient to temperatures of 20° and below in 10 to 15 minutes. Cardioplegia and coronary perfusion are discussed, along with operations for congenital and acquired heart diseases. The latter covers defects of the intra-auricular and interventricular septa, stenosis of the pulmonary artery, Fallot's triad and tetrad, mitral stenosis and insufficiency, and aortic defects. M.W.R.

N66-26922# Joint Publications Research Service, Washington, D. C.

ELECTRONIC MATHEMATICAL MACHINES AND MATHEMATICAL METHODS IN MEDICINE

M. L. Bykhovskiy *In its Mod. Tech. Advan. in Med.* 19 May 1966 p 95-109 refs (See N66-26917 15-04) CFSTI: \$4.00

Directions for using mathematical machines to solve medical problems are discussed, and immediate prospects for their use are outlined with respect to the design of diagnostic and information systems. Immediate applications of cybernetics to medicine are considered to involve creation of: (1) a common diagnostic system in the form of a broad organization of particular diagnostic systems, (2) a system to automatically evaluate conditions and control vital body functions during surgery, (3) a system which can receive both current information about the patient and data related to his past development, (4) a broad network of automated information medical information systems, (5) a means to utilize other case histories in the treatment of a patient, and (6) models of the functional systems in man under both normal and pathological conditions. M.W.R.

N66-26923# Joint Publications Research Service, Washington, D. C.

BIOELECTRIC CONTROL IN CARDIOLOGY

Ye. B. Babitskiy *In its Mod. Tech. Advan. in Med.* 19 May 1966 p 110-121 refs (See N66-26917 15-04) CFSTI: \$4.00

Prospects for the use of bioelectric control in experimental and clinical cardiology are discussed in a general article which considers certain theoretical aspects of the synchronization of research on heart activity with periods of excitation and the phases of the heart cycle. Methods employed are mentioned, as well as the difficulties inherent in their use. Practical aspects in applying bioelectric control are discussed, various uses of X-rays in cardiology are reviewed, and injection of drugs directly into the coronary vessels is mentioned as an application of the principle of bioelectric control. M.W.R.

N66-26924# Joint Publications Research Service, Washington, D. C.

ARTIFICIAL ARMS WITH BIOELECTRIC CONTROL

Ya. S. Yakobson, Ye. P. Polyan, and V. M. Bernshteyn *In its Mod. Tech. Advan. in Med.* 19 May 1966 p 122-145 refs (See N66-26917 15-04) CFSTI: \$4.00

Development of prostheses with bioelectric control is considered in terms of devices, power source, and the selection of active muscles for control purposes. Special attention is given to a forearm prosthesis, and its amplifier unit is diagrammed. The hand mechanism with an electric drive is discussed in detail; and its actual use is described. It is pointed out that additional research is underway to increase the power of the grip in the hand and to permit control of individual finger movements. M.W.R.

N66-26927# Joint Publications Research Service, Washington, D. C.

STUDIES IN HIGHER NERVOUS ACTIVITY

3 May 1966 97 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 16, no. 1, Jan.-Feb. 1966 p 34-51, 62-66, 82-87, 96-101, 103-111 (JPRS-35315; TT-66-31751) CFSTI: \$3.00

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2. PRESENT-DAY STATE OF BEHAVIOR GENETICS V. K. Fedorov p 7-27 refs
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4. ON MODELS IN THE PHYSIOLOGY OF THE NERVOUS SYSTEM V. U. Degtyar p 34-41 refs
5. DIFFERENTIAL SENSITIVITY OF KINESTHETIC AND THERMAL ANALYZERS IN HEALTHY PERSONS AND IN PATIENTS SUFFERING FROM NEUROGENIC CARDIOVASCULAR DISORDERS A. V. Zav'yalov p 42-51 refs (See N66-26930 15-04)
6. QUANTITATIVE CHARACTERISTICS OF TEMPORAL SUMMATION IN THE POSTERIOR COLLICULI AND LATERAL LEMNISCUS OF THE RAT BRAIN I. A. Vartanyan p 52-64 refs
7. PRIMARY POTENTIALS IN ANIMALS IRRADIATED DURING THE ANTENATAL PERIOD A. M. Ivanitskiy p 65-75 refs (See N66-26931 15-04)
8. FUNCTIONAL CHARACTERISTICS OF VISUAL CENTER NEURONS IN THE FROG IN RELATION TO INTENSITY OF PHOTIC STIMULUS p 76-79 refs (See N66-26932 15-04)
9. CONDITIONING OF AVOIDANCE AND ALIMENTARY REFLEXES TO ELECTRICAL SKIN STIMULATION M. I. Tashmukhamedova p 80-83 refs (See N66-26933 15-04)
10. EFFECT OF INTERMITTENT PHOTIC STIMULATION ON HIGHER NERVOUS ACTIVITY OF DOGS N. N. Kudryavtseva p 84-86 refs (See N66-26934 15-04)

N66-26928# Joint Publications Research Service, Washington, D. C.

ELABORATION OF A VASCULAR CONDITIONED REFLEX IN MAN TO A CHANGE IN THE TENSION OF AN ELECTROMAGNETIC FIELD OF HIGH FREQUENCY

G. F. Plakhanov and V. V. Vedyushkina *In its Studies in Higher Nervous Activity* 3 May 1966 p 1-6 refs (See N66-26927 15-04) CFSTI: \$3.00

The effects of changes in electromagnetic field on the vascular conditioned reflex was investigated using a plethysmographic method. The conditioned stimulus was the change in tension of a high frequency electromagnetic field generated by a portable diathermy apparatus having a basic frequency of 735 kilocycles per second. A baseline was established when the wrists and one third of the forearm were placed in a plethysmograph with warm water (35°C). Then, as the unconditioned stimulus, cold water (4°C) was passed through a copper coil on the left hand of the subject. After shutting off the stimuli, warm water (35°C) was passed through the coil for 15-20 seconds. It was noticed that capacitance coupling as the experimenter's hand approached the apparatus noticeably increased the field intensity. Tests were conducted to determine the effect of rotation of the apparatus, and of connecting the wire to the terminal lead. Graphs of the data are included. Clear-cut conditioned reflex constriction of the vessels was obtained. The possible effects of the apparatus on the results are discussed. N.E.N.

N66-26929# Joint Publications Research Service, Washington, D. C.

PROLONGED SHIFTS OF THE STEADY POTENTIAL OF THE CORTEX IN RESPONSE TO PHOTIC AND ELECTRICAL STIMULATION OF NON-SPECIFIC BRAIN STRUCTURES
Zh. P. Shuranova *In its Studies in Higher Nervous Activity* 3 May 1966 p 28-32 refs (See N66-26927 15-04) CFSTI: \$3.00

Photic and electrical stimulation experiments were conducted on rabbits to investigate bioelectrical activity on the surface and in deep layers of the cortex. Details of the preparation and instrumentation are given. The responses to rhythmical photic stimulation in the visual cortex were found to be of two basic forms: (1) a slow potential shift, negative at the surface and positive deep in the cortex, whose duration usually corresponded to the duration of stimulation; and (2) a slow shift of potential, negative both on the surface and deep in the cortex, which usually lasted longer than the period of stimulation. The response recorded in the cortex upon low frequency electrical stimulation of the medial thalamus in its vertical distribution showed a similarity to the first photic response. A high frequency stimulation produced a response similar to the second photic response. It was concluded that prolonged, photic stimulated potential shifts are nonuniform in origin and may be related predominantly to excitation of the medial thalamus or to activation of the brain stem reticular formation. N.E.N.

N66-26930# Joint Publications Research Service, Washington, D. C.

DIFFERENTIAL SENSITIVITY OF KINESTHETIC AND THERMAL ANALYZERS IN HEALTHY PERSONS AND IN PATIENTS SUFFERING FROM NEUROGENIC CARDIOVASCULAR DISORDERS
A. V. Zav'yalov *In its Studies in Higher Nervous Activity* 3 May 1966 p 42-51 refs (See N66-26927 15-04) CFSTI: \$3.00

Muscular and thermal differential sensitivity was investigated in healthy subjects and in patients with neurocirculatory dystonia or hypertension. For studying kinesthesia, the subject held a polyethylene bag, and water was admitted slowly until the subject no longer perceived a slight increase in weight. In the thermal sensitivity test, the subject placed the palm of his hand on a disk formed by several coils of rubber tubing through which increasingly water was passed. The

subject noted each minimal temperature increment perceived. Graphs of the data are presented. Among the conclusions are: the variability of temperature sensitivity is significantly above the variability of muscular sensitivity; in patients of both groups there was a marked reduction in muscular sensitivity and an increase in its variability over the healthy subjects; and furthermore, in patients with hypertension, a substantial reduction in temperature sensitivity was noticed. N.E.N.

N66-26931# Joint Publications Research Service, Washington, D. C.

PRIMARY POTENTIALS IN ANIMALS IRRADIATED DURING THE ANTENATAL PERIOD

A. M. Ivanitskiy *In its Studies in Higher Nervous Activity* 3 May 1966 p 65-75 refs (See N66-26927 15-04) CFSTI: \$3.00

The primary response of the cerebral cortex in rabbits irradiated in embryonic development was examined. Two groups of rabbits were irradiated with a dose of 400 r at 20 r/min, one group on the 15th day and the other on the 23rd day. A third group was used as a control. The electrodes were implanted intradermally or extradurally over the visual cortex, and the operation was performed under nembutal narcosis. Potentials were recorded on a 4-channel electroencephalograph. Within the control group, the primary response was of the classical positive and negative phases, approximately equal in amplitude. In the rabbits irradiated on the 15th day, only slight differences were noticed: some prolongation of the latent period of the response and an increase in its amplitude. In the animals irradiated on the 23rd day, it was observed that: the positive phase was significantly reduced; immediately following the primary response there was a profound fluctuation approximating the negative phase amplitude; and nembutal produced a shift toward normalization in the primary response. N.E.N.

N66-26932 Joint Publications Research Service, Washington, D. C.

FUNCTIONAL CHARACTERISTICS OF VISUAL CENTER NEURONS IN THE FROG IN RELATION TO INTENSITY OF PHOTIC STIMULUS

L. I. Mkrtycheva and V. G. Samsonova *In its Studies in Higher Nervous Activity* 3 May 1966 p 76-79 refs (See N66-26927 15-04) CFSTI: \$3.00

The impulse activity of silent neurons of the roof of the mid-brain in curarized frogs in the presence of photic stimulation was investigated. The electrical response was recorded extracellularly by a glass microelectrode, and the flash intensity was altered by an optical wedge and neutral filters. Most silent neurons of the tectum responded to energy of the order of 1 lumen-second, but a few cells responded only to 10 lum-sec or more. It was observed that most cells responded to a lower energy level than most of the cells with long latency and the rapidly adapting units. The tectum cells differ also with respect to their ability to respond to an increase in the discharge frequency in a limited range of photic energy. The range for slowly adapting units was broader than for rapidly adapting units. Graphs are presented for the neuron distributions with respect to light stimuli and with respect to the range of light energy producing augmentation of cell activity. N.E.N.

N66-26933# Joint Publications Research Service, Washington, D. C.

CONDITIONING OF AVOIDANCE AND ALIMENTARY REFLEXES TO ELECTRICAL SKIN STIMULATION

M. I. Tashmukhamedova *In its Studies in Higher Nervous Activity* 3 May 1966 p 80-83 refs (See N66-26927 15-04) CFSTI: \$3.00

A defensive reflex of avoidance and alimentary conditioned reflex to electrical skin stimulation in dogs was investigated. The stimulus, a direct current applied to the right anterior paw, ceased upon elevation of the paw to an established height. The food, a meat-sugar powder with cooked meat, was supplied 2.5 or 10 seconds following the circuit break. Variations in the approach are given, and graphs of conditioned avoidance are included. It was concluded that electrical skin stimulation evoked a conditioned protective reflex of the stimulated paw and also an alimentary conditioned reflex.

N.E.N.

N66-26934# Joint Publications Research Service, Washington, D. C.

EFFECT OF INTERMITTENT PHOTIC STIMULATION ON HIGHER NERVOUS ACTIVITY OF DOGS

N. N. Kudryavtseva *In its Studies in Higher Nervous Activity* 3 May 1966 p 84-86 refs (See N66-26927 15-04) CFSTI: \$3.00

The higher nervous activity in dogs in the presence of intermittent photic stimulation was investigated and compared to the effects of constant intensified illumination. Dogs studied under constant illumination were used, and tests were arranged according to a salivary food method. After a given level of conditioned reflexes had been established (positive at 300 beats/min and inhibitory at 60 beats/min), tests were conducted with a background of constantly operating intermittent light of different energies. Two experiments were done: (1) with a flash frequency of 3 flashes/sec synchronously to both eyes, and (2) a frequency of 3 and 5 flashes asynchronously to the opposite eyes. Tabulated data is presented and the results discussed. It was concluded that additional stimulation in the form of light flashes creates difficult conditions for the nervous system of dogs.

N.E.N.

N66-26966# Joint Publications Research Service, Washington, D. C.

STUDIES IN OCCUPATIONAL DISEASES

26 May 1966 12 p Transl. into ENGLISH from Med. Gazeta (Moscow), Mar. 1966 (JPRS-35717; TT-66-32152) CFSTI: \$1.00

CONTENTS:

1. PREVENTION OF VIBRATION SICKNESS G. Chernyavskiy and V. Kunitsyn p 1-3
2. THE PHYSIOLOGY OF LABOR OF THE MINER Ye. Manzyuk p 4-7

N66-26967# Joint Publications Research Service, Washington, D. C.

PHOSPHOLIPID METABOLISM AND MINUTE HEART VOLUME

17 Feb. 1966 19 p refs Transl. into ENGLISH from Byull. Ekspit. Biol. i Med. (Moscow), v. 60, no. 11, Nov. 1965 p 50-53, 118-121 (JPRS-34191; TT-66-30632) CFSTI: \$1.00

CONTENTS:

1. PHOSPHOLIPID METABOLISM IN THE RAT BRAIN DURING HYPOXIA AND DURING THE POST-HYPOXIC PERIOD V. Ya. Dvorkin and I. P. Pavlov p 1-5 refs (See N66-26968 15-04)
2. A METHOD FOR RECORDING MINUTE HEART VOLUME IN RABBITS USING PHOSPHORUS-32 K. M. Ester and V. I. Kandror p 6-12 refs (See N66-26969 15-04)

N66-26968# Joint Publications Research Service, Washington, D. C.

PHOSPHOLIPID METABOLISM IN THE RAT BRAIN DURING HYPOXIA AND DURING THE POST-HYPOXIC PERIOD

V. Ya. Dvorkin and I. P. Pavlov *In its Phospholipid Metab. and Minute Heart Vol.* 17 Feb. 1966 p 1-5 refs (See N66-26967 15-04) CFSTI: \$1.00

For this investigation, the animals were given subcutaneous injections of radioactive phosphate, and placed in a pressure chamber. The phospholipids of the rat cerebral hemispheres were divided into five fractions, and determinations were made of the phosphorous content, and its specific radioactivity in each fraction. A table which summarizes the data obtained is provided. This table shows a decrease in the relative specific radioactivity of the phosphatide acid and the polyglycerophosphatide fractions. A greater decrease was found in the aminophospholipid and sphingomyelin fractions. The maximum decrease was observed in the phosphoinositide and phosphatidylcholine fractions. These and additional results are discussed briefly.

H.S.W.

N66-26969# Joint Publications Research Service, Washington, D. C.

A METHOD FOR RECORDING MINUTE HEART VOLUME IN RABBITS USING PHOSPHORUS-32

K. M. Ester and V. I. Kandror *In its Phospholipid Metab. and Minute Heart Vol.* 17 Feb. 1966 p 6-12 refs (See N66-26967 15-04) CFSTI: \$1.00

Existing experimental methods for determining the minute heart volume of small animals using beta and gamma ray sources required frequent blood letting, thereby introducing errors into the readings. A method is described, using P³² as a beta emitter, which allows measurements to be made with the heart still intact. This method requires obtaining a curve of the changes in the concentration of the isotope, at a particular point of the arterial bed, after it has been injected into a vein. To assure prolonged retention of P³² in the vascular bed, the erythrocytes were labeled with radioactive phosphorus. Additional details of the process are given; some results of an experiment conducted using this method are provided; and its value is assessed.

H.S.W.

N66-27037*# Aeronutronic, Newport Beach, Calif.

EXPERIMENTAL STUDIES FOR THE DETECTION OF PROTEIN IN TRACE AMOUNTS Quarterly Status Report, 1 Mar.-31 May 1966

E. R. Walwick, J. D. Albert, and B. R. Zalite [1965] 6 p ref (Contract NASw-770) (NASA-CR-64051; U-3156) CFSTI: HC \$1.00/MF \$0.50 CSCI 06A

Research was conducted on methods to extract and prepare organic materials from soils; and the interaction of these materials with thiocarbocyanine was investigated. The approach was: (1) to determine the tendency of inorganic polyanions which form or are stable in aqueous systems to change the dye spectrum; and (2) to observe the reaction of the dye with soluble and colloidal inorganic polyanions extractable from soil. In addition, a method was developed to separate inorganic compounds from the polymeric organic materials, while maintaining an optimum extraction of the organic material. The procedures are described; and some preliminary results are presented.

D.T.

N66-27041*# Stanford Univ., Calif. Biophysics Lab.
PHOTOCHEMISTRY OF DL-PHENYLALANINE

Dean H. Kenyon Dec. 1964 151 p refs
(Grants NSG-218-62; NIH-GMS-2G-712-C3; NIH-GMS-2G-712-C2)
(NASA-CR-57741; BL-124) CFSTI: HC \$5.00/MF \$1.00 CSCL 06A

A detailed, quantitative investigation of DL-phenylalanine photochemistry was undertaken. The experimental procedures and characterizations are described. By using paper chromatographic solvent systems, several photoproducts were identified. The kinetics of photoproduct accumulation and phenylalanine loss were determined for oxygen-saturated and oxygen-free solutions and under several conditions. The data were used to estimate quantum yields. Among the conclusions are: photoexcitation energy initially confined to the benzene ring can be subsequently transferred to the side chain; the most labile side chain carbon-carbon bond is that between the carboxyl and alpha carbons; molecular oxygen is required for the synthesis of tyrosine, DOPA, and the photopolymer; the optical density increases, occurring in uv-irradiated solutions of phenylalanine, are associated with the synthesis of photopolymer; and several different free radical species are formed as primary photodissociation products of phenylalanine.

N.E.N.

N66-27133# Vitro Engineering Co., New York.
USE OF RADIATION TECHNIQUES FOR THE INHIBITION OF BACTERIAL GROWTH IN LIQUID MEDIA
S. K. Hellman Washington, AEC, 15 Jul. 1965 47 p refs
(Contract AT(30-1)-3331)
(KLX-1872) CFSTI: HC \$2.00/MF \$0.75

An initial feasibility study of the use of low dose irradiation for inhibiting bacterial growth in liquid media is presented. The proposed technique is based on applying these low doses periodically, on a scheduled basis, so as to prevent the bacteria population from increasing, thus achieving a steady-state bacteria level over a long period of time. Although there are many applications for the use of low dose irradiation to inhibit bacterial growth in liquid media, the problem of bacteria in jet fuel wing tanks is considered for development of a conceptual irradiation unit design. The basis for the irradiation requirement of the fuel is an experimental program conducted, on a laboratory scale, at the University of Maryland's Gamma Facility. A culture *Pseudomonas aeruginosa* was used to prepare the simulated media. The experiments clearly indicated that control can be achieved at low dosages. However, the actual level depends on the growth rate of the bacteria and the cycle time between doses. It was possible to develop a mathematical correlation from these experiments, suitable for use as a basis for a conceptual design analysis of a commercial irradiation unit for on board treatment of fuel jet aircraft. The particular application under consideration was related to the needs of one specific airline. A conceptual design of a Mobile Fuel Irradiator (MFI) would be capable of treating the fuel in two Boeing-707 type aircraft wing tanks each night was developed. Economically, the technique was determined to be feasible. Areas needing further verification are indicated. Positive results in these experiments would implicate the design and fabrication of commercial units.

NSA

N66-27144# Agricultural and Technical Coll. of North Carolina, Greensboro.
BIOCHEMICAL AND IMMUNOLOGICAL STUDIES OF X-IRRADIATED MICE FOLLOWING BONE MARROW INJECTIONS

George C. Royal, Jr. and Gladys W. Royal 27 Oct. 1965 7 p
(Contract AT(40-1)-2399)
(TID-22466) CFSTI: HC \$1.00/HC \$0.50

Body weight, proteins, viscosity, and serotonin decreased in mouse organs following LD₁₀₀ x-irradiation. Isologous bone

marrow therapy acted as a control mechanism, while heterologous (rat) bone marrow therapy reflected inherent biological variation which was detectable in larger standard deviations of relevant parameters. Some rat bone marrow samples offered immediate injection mortality. Thirty percent survival among x-irradiated hosts was usual for rat marrow treated mice. Tibia bovine bone marrow contains some agent or agents apparently capable of circumventing the normal x-irradiation response through an unspecified, altered glycolipid metabolism. Details of glycolipid metabolism are desirable to explain the specifics of this hypothesis. The effective agent in bovine marrow therapy for x-irradiated mice appears to be glycolipid generally, and galactolipid specifically; with an implied interrelationship between brain and spleen metabolism during the response to irradiation injury.

Author (NSA)

N66-27201*# National Aeronautics and Space Administration, Washington, D. C.

ON PAROXYSMAL AURICULAR FIBRILLATION IN PATIENTS WITH ATHEROSCLEROTIC CARDIOSCLEROSIS [O PRISTUPOOBRAZNOY FORME MERTSATEL'NOY ARITMII U BOL'NYKH ATROSKLEROTICHESKIM KARDIOSKLEROZOM]

Z. M. Volynskiy and V. S. Solov'yeva Nov. 1963 10 p refs
Transl. into ENGLISH from Terap. Arkh. (Moscow), v. 33, no. 7, Jul. 1961 p 10-16

(NASA-TT-8557) CFSTI: HC \$1.00/MF \$0.50 CSCL 06E

Paroxysmal auricular fibrillation in patients with atherosclerotic cardiosclerosis develops most frequently in connection with acute transitory, or more prolonged, disturbances of the coronary circulation. Other factors, as pneumonia, disturbances of the gastrointestinal tract, etc., play a less frequent role. In these cases, the anatomo-physiological basis for paroxysmal auricular fibrillation is either transient ischemia of the auricular muscle, overexertion of the auricular muscle in connection with the impairment of circulation in the ventricular muscle, or their overexertion due to a diminished output in the lesser circulation during inflammatory pulmonary processes. It is quite possible that there is a reflex action on the auricular muscle by different internal organs. Any one of these factors, or a combination of them, can bring about the development of multiple foci of excitability in the auricular muscle. Author

N66-27218# Institute for Research, State College, Pa.
PURPOSIVE SYSTEMS THEORY AND APPLICATION
Final Report, 1 Apr. 1963-30 Jun. 1964

H. Edward Massengill, Jr. Bedford, Mass., AFSC, Electron Systems Div., Jul. 1964 48 p refs
(Contract AF 19(628)-2968)

(ESD-TDR-64-531; AD-609377) CFSTI: HC \$3.00/MF \$0.75

The purpose of this paper is to summarize the approach and theory on which the research performed is based. Basically, the approach is the use of decision theory, with the assumption that people behave optimally given their formulations and constraints, to study the significant tasks that people perform. The ultimate goal of the approach is to map human behavior onto logic and mathematics. The emergence of the approach is given along with four basic requirements that we make of any theory to be used in understanding the behavior of individuals. The approach is contrasted with more traditional approaches. The procedure of the approach, task analysis, is explained and is illustrated by examples from the contract research. The place of applications in the approach is dealt with extensively. The paper includes a guide to the more important ideas dealt with in the contract research with references to the relevant contract publications. Abstracts of these publications, seven completed and seven in preparation, are also included.

Author (TAB)

N66-27228*# General Dynamics/Convair, San Diego, Calif.
LIFE SUPPORT SYSTEM FOR SPACE FLIGHTS OF EXTENDED TIME PERIODS: LIQUID/GAS SEPARATION MECHANISMS

S. Mc Cunney and J. Burnett 13 Sep. 1965 37 p refs *Its Rept.*-64-26231

(Contract NAS1-2934)
 (NASA-CR-66060) CFSTI: HC \$2.00/MF \$0.50 CSCL 06K

This report presents a summary of the experiences dealing directly with the several liquid/gas separation mechanisms employed in applications specifically involved with air-water separation. The report summarizes requirements, describes types of mechanisms employed, outlines developmental problems and solutions attempted, briefly discusses current performance of the various units, and recommends actions for continued development as required. Author

N66-27235*# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

BIOENERGETICS OF SPACE SUITS FOR LUNAR EXPLORATION Literature Review

Emanuel M. Roth Washington, NASA 1966 145 p refs (Contract NASr-115)

(NASA-SP-84) GPO: HC \$1.00; CFSTI: MF \$1.00 CSCL 06B

This report reviews environmental information currently available from astrophysical studies, and analyzes the metabolic load imposed on humans exercising under varied terrain and gravity conditions, the metabolic cost of mobility restriction in space suits, and the problem of thermal control in lunar space suits. Author

N66-27236*# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

PHILOSOPHY OF SIMULATION IN A MAN-MACHINE SPACE MISSION SYSTEM

T. M. Fraser Washington, NASA 1966 116 p refs (Contract NASr-115)

(NASA-SP-102) GPO: HC \$0.50; CFSTI: MF \$0.75 CSCL 05H

This report examines the philosophy of simulation as it pertains to manned space activities, with a particular orientation to research in the life sciences. Included are discussions on the nature of simulation; prerequisites for simulation; the fidelity, realism, and transfer of training; and the use of manned simulators. R.N.A.

N66-27259# Los Alamos Scientific Lab., N. Mex.
COMPUTER ANALYSIS OF CELL VOLUME DISTRIBUTIONS

Phillip N. Dean 7 Feb. 1966 51 p refs (Contract W-7405-ENG-36)

(LA-3440) CFSTI: HC \$3.00/MF \$0.50

Two computer programs were written to analyze blood cell volume distributions measured with a Coulter type of cell spectrometer. One of the programs, called AVOL, is used to calculate the mean cell volume of any type of distribution and to plot the data in various formats. The other program, called CELVOL, uses an iterative least-squares technique to fit either normal, log-normal, or skewed-normal distributions to the data. Either single- or double-peak distributions can be fitted. The program also converts the results of the fit to cell concentration in each peak in cells per cubic millimeter, standard deviation in cubic microns, and mean cell volume in cubic microns. For red blood cells the mean cell volume is also calculated from the hematocrit and included in the data output listing. Author (NSA)

N66-27295# Air Force Systems Command, Wright-Patterson AFB, Ohio. Air Force Aero Propulsion Lab.

ASTRONAUT MANEUVERING UNIT TECHNOLOGY

Peter N. Van Schaik *In its Aerospace Expandable Struct.* [1966] p 633-648 refs (See N66-27266 15-32) CFSTI: HC \$11.00/MF \$3.25

The modular maneuvering unit, the astronaut maneuvering unit, and the remote maneuvering unit are discussed. The current systems, and the design criteria and new subsystems are reviewed. The problem areas, such as plume heating, stabilization, and system redundancy, are described. The present technology is reported, and future areas of development are indicated. N.E.N.

N66-27319*# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.

HUMAN RESPONSE TO SUSTAINED ACCELERATION

T. M. Fraser Washington, NASA, 1966 137 p refs

(Contract NASr-115)

(NASA-SP-103) GPO: HC \$1.00; CFSTI: MF \$1.00 CSCL 06S

Literature dealing with human response to sustained acceleration is critically reviewed, and an annotated bibliography of all reference material is presented. The natural history of exposure to sustained acceleration is described, and the physiological effects, tolerance thresholds, and performance capacities are delineated. Among the broad conclusions which were drawn from the review are: (1) The basic physiological response to sustained acceleration in all vectors depends primarily on the development of a hydrostatic pressure head related to the magnitude of the acceleration. (2) The development of compensatory measures requires about 5 seconds, and is influenced by the rate of onset of acceleration. (3) In the positive and negative vector, retinal and cerebral circulation effects are observed; in the transverse vector, respiratory effects occur, although the development of alveolar shunts is probably physiologically more significant. In the lateral vector, physiological shunts and arterial desaturation may be important. (4) The cellular response appears to represent the response to hypoxemia or to general stress. Areas of limited data are pointed out, and recommendations for specific research are proposed. M.G.J.

N66-27343# Istituto Diricerche Farmacologiche (Mario Negri), Milan (Italy).

SELECTIVE PROTECTION OF DAMAGES INDUCED BY X-IRRADIATION AND RADIOMIMETIC DRUGS Progress Report, 1 Nov. 1964-31 Jan. 1965

S. Garattini, V. Palma, I. Meyers-Degli Innocenti, and A. Guaitani [1965] 8 p ref

(Contract IAEA-204/RB)

(NP-15666)

Studies were made to determine in a clear and reproducible way the conditions in which radioprotector drugs interact with alkylating agents in tumor-bearing mice. However, only negative data are reported. The drugs tested were: serotonin creatinine sulfate; L-cysteine; cysteamine-HCl; thiourea; AET; 2-methyl-piperazine-dithioformic acid; morpholine salt of morpholino-dithioformic acid. Cyclophosphamide and DL-sarcosine were used as radiomimetic agents. Data are tabulated. NSA

N66-27345# Istituto di Ricerche Farmacologiche (Mario Negri), Milan (Italy).

SELECTIVE PROTECTION OF DAMAGES INDUCED BY X-IRRADIATION AND RADIOMIMETIC DRUGS Final Report

S. Garattini, V. Palma, I. Meyers-Degli Innocenti, and A. Guaitani 30 Sep. 1965 23 p refs *Its Rept.*-4

(Contract IAEA-204/RB)

(NP-15668)

Studies were made on the interaction of several radioprotectors with different antitumoral agents in two experimental

tumors, namely, sarcoma 180 and Ehrlich carcinoma transplanted in mice in the solid form. The radioprotectors used were: serotonin creatinine sulfate; L-cysteine; cysteamine; thiourea; AET; 2-methylpiperazinedithioformic acid; and morpholine salt of morpholinodithioformic acid. The antitumoral drugs were: DL-sarcosine; 2,4,6-tris(1-aziridinyl)-s-triazine; 2,2'-dichloro-N-methyl-diethylamine; N,N-bis(2-chloroethyl)alanine; 5-fluorouracil; Mitomycin C; Vinkaleu-coblastine sulfate; and cyclophosphamide. It was concluded that indiscriminate use of radioprotectors in combination with radiomimetic drugs and, possibly, with irradiation, are not useful to achieve better antitumoral effect and even disadvantageous because of the antagonism toward the antitumoral activity of radiomimetic drugs. 58 references are cited.

NSA

N66-27358# Oak Ridge National Lab., Tenn. Health Physics Div.

A COMPUTER CODE FOR ESTIMATION OF BODY BURDEN OF ^{90}Sr BASED ON O.R. AND BONE REMODELING WHICH ARE AGE DEPENDENT

Henry L. Fisher, Jr. [1965] (4 p refs Presented at the Ann. Bio-Assay Meeting, Albuquerque, N. Mex. (Contract W-7405-ENG-26)

(ORNL-P-1830; CONF-651008-5) CFSTI: HC \$1.00/MF \$0.50

A computer code for analysis of data on ^{90}Sr metabolism as a function of age was developed. A model for estimating ^{90}Sr body burden and metabolism as a function of age of the individual is described. In the model the skeleton is considered as a single compartment with a simple constant turnover rate coefficient for each age of the individual, and any recycling or exchange of Sr between various parts of the body is neglected. The results using the model were compared with others by applying it to several simple cases. NSA

N66-27386# California Univ., Berkeley. Lawrence Radiation Lab.

PHOTOBIOCHEMISTRY—DEHYDRATION CONDENSATION IN AQUEOUS SOLUTION

Gary David Steinman (Ph. D. Thesis) Jan. 1966 211 p refs (Contract W-7405-ENG-48)

(UCRL-16566) CFSTI: HC \$6.00/MF \$1.25

The results reported from many laboratories over the past decade make it clear that monomers necessary for biogenesis could have been formed under conditions believed to have existed on the primitive Earth. Mechanisms by which the biological monomers may have condensed in aqueous solution to produce more complex compounds, such as phosphates, acetates, pyrophosphates and peptides are discussed with emphasis on the role of dicyandiamide and dicyanamide in the types of condensations occurring on the primitive Earth. Results are reported from studies of the mechanism of dipeptide synthesis promoted by dicyanamide under conditions of simple, relatively stable reactants, moderate temperature, and dilute, aqueous solutions. It is postulated that this study demonstrates one means by which essential biochemicals could have been formed on the primitive Earth, thus providing materials needed for the origin of living systems. NSA

N66-27436# Air Force Systems Command, Wright-Patterson AFB, Ohio. Aero Propulsion Lab.

MAINTENANCE IN A WEIGHTLESS ENVIRONMENT

Chester B. May 1965 60 p refs

(AD-630807) CFSTI: HC \$3.00/MF \$0.75

Design criteria evolved through tests in simulated zero-g environments enabled the development of techniques, equipment, and tools for space maintenance and the study of man's work ability under weightless conditions. Evaluations of the test data are encouraging in the prediction of a practical space maintenance capability. However, because of the combined effects of extended time in space, the spacecraft performance in flight, and the space environment, conclusions based on laboratory tests must be verified by experimentation on test beds designed for extended space operations. Refinements to the prototype techniques, equipment, and tools are certainly anticipated after the evaluation of these in-space tests. TAB

N66-27442# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

APPARATUS FOR AUTOMATIC RECORDING OF THE ARTERIAL BLOOD PRESSURE

L. A. Kazar'yan and V. V. Lepeshkin 21 Jan. 1966 7 p Transl. into ENGLISH from Soviet patent no. 166098 (Appl. no. 857493/31-16, 19 Sep. 1963) 3 p

(FTD-TT-65-1579/1+2+4; AD-630994) CFSTI: HC \$1.10/MF \$0.50

An apparatus for the automatic recording of the arterial blood pressure is described. It consists of a pressure cuff which fastens to the shoulder of the test subject, a balloon with compressed air, and a miniature source of electric power supply. An automatic pressure device in the form of a spasmodic pneumatic switch is set in motion by means of a miniature syphon with an electric contact in the transmitter circuit, accomplishing a periodic variation of air pressure in the pneumatic system for compressing the blood vessels. The apparatus is different in that the recording of the pulse oscillations is accomplished by means of a thermoanemometer transmitter, the output of which is switched onto a recording oscillograph. TAB

N66-27468# Yugoslav Academy of Sciences and Arts, Zagreb. Inst. for Medical Research.

A STUDY OF THE MECHANISM OF INITIAL RADIATION EFFECTS Final Report, Nov. 1, 1963-Oct. 31, 1965

Yvette Skreb [1965] 44 p refs /ts Rept.-6

(Contract IAEA-217/R1/RB)

(NP-15855)

Results are reported from studies on the effects of γ and uv radiations on the content of DNA, RNA, and proteins in whole amoeba, amoeba fragments with the nucleus, and amoeba fragments without the nucleus at various time intervals after exposure. The uptake of ^{14}C -adenine, ^{14}C -phenylalanine, ^{14}C -uracil, ^3H -cytidine, and ^3H -thymidine during the synthesis of these constituents were followed autoradiographically. NSA

N66-27481# General Motors Corp., Santa Barbara, Calif. Defense Research Labs.

BATHYPHOTOMETRIC STUDIES OF THE LIGHT REGIME OF ORGANISMS OF THE DEEP SCATTERING LAYERS Final Report

William D. Clarke Jan. 1966 50 p refs

(Contract AT(04-3)-584)

(SAN-584-1; TR-66-02) CFSTI: HC \$2.00/MF \$0.50

The swimming capabilities of marine organisms make them important agents for the distribution and transportation of radioisotopes. Since the organisms associated with the deep scattering layers of the ocean move across density gradients such as the thermocline and the halocline, which normally inhibit physical mixing, and since these organisms provide forage for commercially-harvested fish, they may transfer

radioactive substances from ocean waters to the food-chain of man. Results are reported from a study of the migrating mesopelagic organisms associated with the deep scattering layers of the Santa Barbara Channel, Calif. This area is part of that studied by the AEC in connection with the Vandenberg Air Force Base missile launching site. The principal phyto-genic groups of migrating organisms were sampled at constant light levels, or isolumens, and plankton were sampled from the different strata of water between the maximum sampling depths and the surface. Sampling methods and equipment are described in detail. The migrating mesopelagic organisms associated with the deep scattering layers of the Santa Barbara Channel appear to form a series of partially overlapping layers that are correlated most closely with light intensity in their vertical distributions. Data are included on the distribution of the various species found. NSA

**N66-27488*# Republic Aviation Corp., Farmingdale, N. Y.
STUDY OF THE NORMAL FECAL BACTERIAL FLORA OF MAN**

Lorraine S. Gall Washington, NASA, Jun. 1966 170 p refs (Contract NASw-738)
(NASA-CR-467) CFSTI: HC \$5.00/MF \$1.00 CSCL 06M

In order to obtain baseline data for evaluating the effect of space flight on the fecal flora, aerobic and anaerobic microbiological studies were conducted on a series of fecal samples taken from 25 adult men. The predominating bacteria were isolated for morphological and physiological examination. The methods used for collection, isolation, characterization, and study are described, and details are given on the procedures which deviated from the standard technique. Sixteen type cultures, representing the most frequently occurring strict anaerobes isolated, were studied to assess their possible role in the body; results indicate that certain of these cultures can carry out many major processes associated with digestion, including the metabolism of certain carbohydrates, fats, and proteins, and the production of certain B vitamins. It was also established that anaerobes outnumber aerobes by 1000 to 10,000, and that strictly anaerobic bacteria rather than facultative anaerobes compose over 90% of the most predominating micro-organisms. M.G.J.

N66-27495*# National Aeronautics and Space Administration, Washington, D. C.

METHODS OF INVESTIGATING THE VESTIBULAR APPARATUS [METODY ISSLEDOVANIYA VESTIBULYARNOGO APPARATA]

R. M. Bayevskiy May 1966 11 p Transl. into ENGLISH from the publ. "Fiziologicheskiye Metody v Kosmonavtike" Moscow, Izd. "Nauka", 1965 p 246-250

(NASA-TT-F-10125) CFSTI: HC \$1.00/MF \$0.50 CSCL 06P
Following the discovery of vestibulo-vegetative and vestibulo-sensory disorders during a manned Soviet space flight, the characterization of the functional state of the vestibular apparatus was included in physiological measurements. To evaluate the reflex changes produced by vestibular stimulations, the electrooculographic method was used. It is reported that nystagmus is one of the constant reflex reactions of striated muscles, and this method may be used to record nystagmic oscillations. The problems inherent in obtaining recordings by this method are discussed, and a technique is described which uses detachable electrodes located near the external ocular angles that are connected to amplifiers by push button connectors extended to the helmet. The data derived from this technique makes it possible to evaluate the oculomotor reactions, oculomotor activity, vocal reactions, and the control of nystagmic reactions. This method was used in four flights and the results of obtaining physiological data by this means are assessed. H.S.W.

N66-27500*# National Aeronautics and Space Administration, Washington, D. C.

BIOLOGICAL MECHANISMS OF OXALACETIC ACID DECARBOXYLATION [BIOLOGICHESKIYE MEKHAZIMY DEKARBOKSILIROVANIYA SHCHAVELEVOU KSUSNOY KISLOTY]

N. K. Nagradova May 1966 37 p refs Transl. into ENGLISH from Usp. Sovrem. Biol. (Moscow), v. 52, no. 1 (4), 1961 p 3-18

(NASA-TT-F-10143) CFSTI: HC \$2.00/MF \$0.50 CSCL 06A

Biological mechanisms of oxalacetic acid decarboxylation are reviewed on the basis of reported data. The associated process of CO₂ fixation is also extensively discussed, particularly in terms of the role of malic enzyme, which plays a predominant part in the formation of dicarboxylic acids in both plant and animal tissues. The interrelationships of the various reactions of oxalacetic acid decarboxylation are presented and an overall diagram of these reactions is given. The action of the Utter-Kurahashi enzyme, phosphorylenolpyruvate carboxylase, and other carboxylases of oxalacetic acid involved in the formation of oxalacetic or its decarboxylation is discussed; and a mechanism of the decarboxylation is presented. The role of biotin in this process is also discussed, as well as the relation of oxalacetic acid conversions to the synthesis of glycogen. Author

N66-27501*# National Aeronautics and Space Administration, Washington, D. C.

PHYSIOLOGY OF WATER AND SODIUM CHLORIDE [ZUR PHYSIOLOGIE DES WASSERS UND DES KOCHSALZES]

O. Cohnheim, G. Kreglinger, L. Tobler, and O. H. Weber May 1966 35 p refs Transl. into ENGLISH from Z. Physiol. Chem. (Berlin), v. 78, 1912 p 62-88

(NASA-TT-F-10146) CFSTI: HC \$2.00/MF \$0.50 CSCL 06S

Results of experiments on sodium chloride excretion of the human organism at high altitudes during physical exertion, at rest, and with low- and high-salt diets are discussed. Sodium chloride depletion and concomitant permanent weight loss was observed only during profuse perspiration. Excessive chlorine loss led to reduction of gastric HCl secretion with resultant muscular fatigue due to impaired deacidification of the tissues. Author

N66-27506# Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information Extension.

PHYSIOLOGICAL STUDIES EMPLOYING RADIOISOTOPES

Helen L. Ward, comp. May 1965 309 p refs

(TID-3515, Suppl. 1) CFSTI: HC \$6.00/MF \$1.50

References (2578) on the use of radioisotopes in physiological studies are given to scientific literature published during the period 1958-1963. Separate author, isotope, and report number indexes are included. Author (NSA)

N66-27512# California Univ., Livermore. Lawrence Radiation Lab.

PROGRAM BOOK FOR THE ADVISORY COMMITTEE FOR BIOLOGY AND MEDICINE OF THE UNITED STATES ATOMIC ENERGY COMMISSION, PART II

10 Mar. 1966 177 p refs

(Contract W-7405-ENG-48)

(UCRL-14739, Pt. 2) CFSTI: HC \$5.00/MF \$1.00

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N66-27533* Stanford Univ., Calif.

PREDICTOR AIDED TRACKING IN A SYSTEM WITH TIME DELAY: PERFORMANCE INVOLVING FLAT SURFACE, ROLL, AND PITCH CONDITIONS

John M. Leslie, Lawrence A. Bennigson, and Michael E. Kahn
Mar. 1966 51 p refs
(Grant NSG-111-61)

(NASA-CR-75399) CFSTI: HC \$3.00/MF \$0.50 CSCL 05H

This report describes a study of a human operator's ability to pursuit track a course under conditions where his control commands are delayed 2.6 seconds. The purpose was to prove the effectiveness of a predictor as an aiding device to an operator who has the task of driving a vehicle through such a transmission delay. Thirty subjects were tested under combinations of four speeds (2,3,4,5 mph), four terrain conditions (flat, roll, pitch, roll and pitch), and three control modes (no-delay, delay without predictor, delay with predictor). Tracking performance with the predictor proved to be an improvement over performance without predictor to a confidence level of at least 99% for all conditions tested.

Author

N66-27536* Exotech, Inc., Alexandria, Va.

A STOCHASTIC STERILIZATION MODEL

Samuel Schalkowsky and Robert Wiederkehr 6 May 1966
26 p refs

(Contract NASw-1340)

(NASA-CR-75383; TR-13) CFSTI: HC \$2.00/MF \$0.50 CSCL 06M

An analytical framework is provided to relate pertinent aspects of the experimental determination of microbial resistance to sterilization on the one hand and to the parameters which enter into the definition of operational sterilization requirements on the other. This analytical model differs from existing models in that it is applicable to any resistance function, e.g., the survivor curve need not be exponential. The model is used to correlate the results from survivor counting tests to sampling tests (end-point) and to evaluate the validity of extrapolating from survivor data to low probabilities of contamination when the latter are specified in a number of alternate ways.

Author

N66-27539* California Univ., Los Angeles. Space Biology Lab.

ANALYSIS OF BRAIN WAVE RECORDS FROM GEMINI FLIGHT GT-7 BY COMPUTATIONS TO BE USED IN A THIRTY DAY PRIMATE FLIGHT

W. R. Adey, R. T. Kado, and D. O. Walter [1966] 49 p refs
(Grants NSG-2503; NSG-502; NSG-505; AF-AFOSR-246-63; AF-AFOSR-61-81 et al)

(NASA-CR-75337) CFSTI: HC \$2.00/MF \$0.50 CSCL 06B

Recent developments in acquisition and analysis of electroencephalographic (EEG) data are reviewed, in the frame of their use for physiological monitoring in space flight. The application of spectral analysis, with calculation of coherence functions, is described, and display techniques for compression of long epochs of analysis are reviewed. Results of baseline analyses from a population of 50 astronaut candidates and simple pattern recognition techniques suited to on-line flight monitoring are described. Development toward a 30-day biosatellite flight with a 6.8Kg pigtail macaque monkey are evaluated. Instrumentation will include electroencephalographic, electro-oculographic, and electromyographic implantation, blood pressure transducers in heart chambers and great vessels. Urinary collection procedures will allow inflight analysis. Author

N66-27553# Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CRITICAL STUDY OF SOME SOFT-TISSUE EQUIVALENT MATERIAL. SENSITIVITY TO NEUTRONS OF 1 KeV TO 14 MeV [ETUDE CRITIQUE DE QUELQUES MATERIAUX EQUIVALENTS AUX TISSUS MOUS. SENSIBILITE AUX NEUTRONS DE 1 KeV A 14 MeV]
 Herve De Kerviler, Lucien Pages, and Philippe Tardy-Joubert
 Jul. 1965 14 p refs In FRENCH
 (CEA-R-2833)

The elastic and inelastic reactions of various elements contributing to kerma in standard soft tissue of mice were studied and as a function of neutron energy from 1 KeV to 14 MeV. The ratio of kerma in tissue equivalent material to kerma in soft tissue was also measured. The results of calculations are presented for materials without hydrogen in order to state exactly their neutron sensitivity and for the following hydrogenous materials: Rossi and Failla plastic, MixD, pure polyethylene, and a new CEA tissue equivalent material, a magnesium fluoride and polyethylene compound. Results for γ rays are included. Author (NSA)

N66-27558# Laboratoires du Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).
WORKING CONDITIONS AND SAFETY IN LABORATORIES OF THE DEPARTMENT OF RADIOISOTOPES AT MOL [CONDITIONS DE TRAVAIL ET DE SECURITE DANS LES LABORATOIRES DU DEPARTMENT DES RADIOISOTOPES A MOL]
 R. Constant and J. Mekers Mar. 1965 17 p refs In FRENCH
 (BLG-68-11)

The new installations for the production and distribution of radioisotopes at Mol are described. Author (NSA)

N66-27560# Max-Planck-Institut für Biophysik, Frankfurt am Main (West Germany). Zentralstelle für Atomkernenergie-Dokumentation.
RADIATION EFFECTS ON LIVING TISSUES AND ORGANISMS. SERIES C: BIBLIOGRAPHIES
 W. Stahlhofen, comp. Jun. 1965 168 p refs /ts No. 20
 (AED-C-04-20)

References (563) are given to reports, books, and journals published from 1962 through 1964. Separate author, report number, and subject indexes are included. NSA

N66-27564# Brookhaven National Lab., Upton, N. Y. Health Physics Div.
CALIBRATION AND RESPONSE OF PERSONNEL MONITORING FILM DOSIMETERS TO SYNCHROTRON STRAY RADIATIONS

Leigh F. Phillips and Robert J. Champagne [1965] 10 p refs
 Presented at 1st Symp. on Accelerator Radiation Dosimetry and Experience, Upton, N. Y.
 (Contract AT(30-2)-GEN-16)
 (BNL-9665; CONF-651109-7) CFSTI: HC \$1.00/MF \$0.50

In order to determine effectiveness of personnel monitoring techniques at high energy proton synchrotrons, a careful evaluation of the film badge performance was made. These evaluation studies were performed in various work areas and under a variety of experimental conditions because the synchrotron parameters, such as shielding and experimental arrangements, vary greatly, thus radically changing the quality and quantity of the stray radiation fields. Among the dosimeters employed for this study were the BNL film badge and specially designed tissue-equivalent (TE) ionization chambers. The film badge contains an aluminum and a cadmium filter and an open window. The DuPont sensitive 555 and insensitive 1290 beta/gamma films are used along with the Kodak NTA film packet. Test assemblies containing the film badges and the dosimeters were placed in experimental areas around the two BNL proton synchrotrons. Machine parameters that may influence the data are recorded. Film badge data are analyzed and the assigned dose, as indicated by standard method of film badge interpretation, was compared with the absorbed dose as determined by the ionization chambers. Quality factors implied by the standard personnel monitoring procedure was found to vary from one to 30. These implied quality factors were also compared with measured quality factors, where such information is available. Various factors complicate the interpretation of film badges exposed at the synchrotrons. For example, maintenance work in tunnels during accelerator shutdown results in relatively high gamma exposures which are a result of the induced activity of the machine components. Due to the lack of electronic equilibrium in the area and the occasional occurrence of thermal neutrons, the use of the open window and cadmium portions of the film badge is restricted, leaving only the aluminum filter for proper gamma evaluation at the synchrotrons. Also, the economical procedure of not reading the NTA film in personnel film badges, when no exposure is indicated by the beta/gamma film, is not valid at high energy synchrotrons. Neutron exposures, up to several hundred mRem, have been measured by film badges worn by radiation workers, without any positive exposure indicated on the beta/gamma film. Author (NSA)

N66-27595# Naval Radiological Defense Lab., San Francisco, Calif.

AN ULTRASTRUCTURAL STUDY OF THE DEVELOPMENT OF RADIATION INJURY IN THE LUNG

Theodore L. Phillips 1 Feb. 1966 23 p refs
 (USNRDL-TR-973; AD-630870) CFSTI: HC \$2.60/MF \$0.50

Radiation doses of 2000 R were given to the left hemithorax of a group of 25 rats. At intervals of from one hour to one year following irradiation sections of the lung were examined with the electron microscope. The initial site of radiation damage appears to lie chiefly in the endothelium. The endothelium is sloughed and the original endothelial space is replaced by collagen and mast cell infiltrates. Some capillaries are recanalized by new endothelial cells. Eventually these capillaries attain an appearance similar to that of the original capillary but with a slightly thickened endothelium and basement membrane. If the original capillary architecture is not maintained, massive fibrosis results. The mast cell participates extensively in the repair of the radiation damage and is closely associated with collagen and new capillary formation. It is stressed that the degree of damage occurring

after a given dose of irradiation varies widely and that these observations were made on only small samples of lungs.

Author (TAB)

N66-27603# Georgetown Univ., Washington, D. C. Dept. of Biology.

PERFORMANCE OF SMALL MAMMALS AT LOW BODY TEMPERATURES Progress Report

Joseph A. Panuska 10 Apr. 1966 27 p refs

(Contract DA-49-193-MD-2668)

(AD-630707) CFSTI: HC \$2.00/MF \$0.50

The effect of low body temperature on trained performance was determined, and the causes of performance failure at critical body temperature levels were analyzed. The behavioral analysis included heat reinforcement and shock escape operant procedures. The critical body temperature for performance for the hypothermic rat was found to be 23°-25°C, several degrees C above the level of complete motor collapse. The hamster, a hibernator, showed greater variation in its hypothermic response and failed to perform at lower body temperatures than the rat. Physiological studies were begun on chronically cannulated unrestrained rats during progressive hypothermia and during rewarming. Blood pressures and heart rate were significantly different at certain corresponding temperature ranges during cooling and rewarming phases. Chronically cannulated but anesthetized control rats had consistently lower systolic and diastolic pressures and heart rates during the entire cooling process. A supplementary study on Dimethyl sulfoxide administered IP (3 or 6 g/kg in saline) revealed a significant temperature regulation disturbance at ambient temperatures of 1° 15° and 25°C. Exposure of DMSO treated subjects to 1°C resulted in deep hypothermia for all, at 15°C one-third cooled to ambient temperature. At 25°C, there was a body temperature depression of 3.6°C. It appears, however, that the critical body temperature for performance was not affected by these doses of DMSO.

Author (TAB)

N66-27606# Hughes Aircraft Co., Culver City, Calif.
HUMAN PERFORMANCE UNDER RANDOM AND SINUSOIDAL VIBRATION Final Technical Report, Apr. 1964-May 1965

A. Z. Wiesz, Connie Goddard, and R. W. Allen Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 61 p refs

(Contract AF 33(615)-1908)

(AMRL-TR-65-209; AD-631457) CFSTI: HC \$3.00/MF \$0.75

Two experiments tested human subjects under whole-body vertical vibration to: (1) compare effects on performance of 5 cps sinusoidal, 5 cps random amplitude, and 4-12 cps random vibration equated on the basis of power, and (2) determine acceleration levels at which significant performance decrements are found for each type of vibration. The complex experimental task required two-dimensional compensatory tracking, visual monitoring, and auditory monitoring during 20 minute vibration exposures at levels equated to 5, 15, 25, and 30 percent of the 1 minute human tolerance values for 5 cps sinusoidal vibration. Performance decrements under vibration were restricted to tracking, the most demanding component of the task complex. Tracking performance deteriorated with increasing acceleration levels of each type of vibration. Overall performance differences associated with the different types of vibration equated on the basis of power were not significant. A number of task and procedural variables, including task difficulty, work-rest cycle, and prior experience appear to be important determinants of performance capabilities and fatigue effects found in vibration studies, indicating a need for further investigation of these variables.

Author (TAB)

N66-27609# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.

CORRELOGRAPHIC ANALYSIS OF AFFERENT AND EFFERENT ACTIVITY DURING THE JERK REFLEX Final Technical Report, May 1964-Jun. 1965

James U. Casby and Nils A. Norman Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 53 p refs

(Contract AF 33(615)-1783)

(AMRL-TR-65-171; AD-631487) CFSTI: HC \$3.00/MF \$0.50

Cross-correlation techniques were applied to an analysis of the afferent and efferent nerve traffic associated with the ankle jerk reflex. Primary afferent, secondary afferent and Golgi tendon fiber activity could be detected and monitored and the time course of their activity is shown. The alpha efferent activity could be monitored also and is displayed. The technique was not adequate to show the time course of the gamma efferent activity but some indications of its activity are displayed.

Author (TAB)

N66-27622# St. Louis Univ., Mo. School of Medicine.

IMPEDANCE MEASUREMENTS OF CARDIAC OUTPUT DURING MODERATE HEAT EXPOSURE

Bernell Coleman, Alrick B. Hertzman, Louis S. D'Agrosa, and Franz Flath Wright-Patterson AFB, Ohio, AMRL, Feb. 1966 23 p refs

(Contract AF 33(657)-11551)

(AMRL-TR-66-5; AD-631675) CFSTI: HC \$3.00/MF \$0.50

Cardiac outputs of nude resting subjects were estimated from measurements of the intrathoracic impedance pulses as recorded with the four electrode system. Ambient temperature was increased from 28°C to 43°C. Increases in cardiac output were small, (about 1.0 L/sq.m./min) variable, and due to small increases in heart rate and stroke volume. The greater cardiac output during heat was probably due to the cutaneous vasodilatation as demonstrated in the cutaneous opacity pulses, but this relation was not demonstrated decisively. The ratio of increase in cardiac output to sweating was about the same as that shown previously for cutaneous blood flow and sweating. A decrease occurred in intrathoracic impedance indicating a greater volume of electrolyte fluid in this area. Validation of the thoracic impedance pulses as a measure of right ventricular stroke volume was accomplished in human and canine subjects.

Author (TAB)

N66-27623*# Library of Congress, Washington, D. C. Science and Technology Div.

AEROSPACE MEDICINE AND BIOLOGY. AN ANNOTATED BIBLIOGRAPHY. CUMULATIVE INDEXES, 1952-1961 LITERATURE, VOLUME I-X

Roman Kenk and Elaine S. Vallière, ed. 1966 194 p refs (NASA-CR-75598) CFSTI: HC \$5.00/MF \$1.25 CSCL 06S

Subject matter, corporate author, and author cumulative indexes are presented in an annotated bibliography on aerospace medicine and biology. Literature published between 1952 and 1961 is indexed in this work which includes all the references published in volumes I through X of *Aerospace Medicine and Biology: An Annotated Bibliography*.

M.W.R.

N66-27624*# Library of Congress, Washington, D. C. Science and Technology Div.

AEROSPACE MEDICINE AND BIOLOGY. AN ANNOTATED BIBLIOGRAPHY. 1958-1961 LITERATURE, VOLUMES VII-X, PART 1

Roman Kenk and Elaine S. Vallière, ed. 1966 448 p refs Sponsored by NASA and AF

(NASA-CR-75599) CFSTI: HC \$7.47/MF \$2.25 CSCL 06S

Abstracts of aerospace medicine and biology literature for the years between 1958 and 1961 are presented in a reference book which combines the entries that previously appeared in volumes VII through X of *Aerospace Medicine and Biology: An Annotated Bibliography*. These abstracts are presented alphabetically by author under categories within the headings of general aspects, biology, general physiology, neurophysiology and sensory physiology, psychology and psychiatry, and effect of environmental factors and stresses. M.W.R.

N66-27625* # Library of Congress, Washington, D. C. Science and Technology Div.

AEROSPACE MEDICINE AND BIOLOGY. AN ANNOTATED BIBLIOGRAPHY. 1958-1961 LITERATURE, VOLUMES VII-X, PART 2

Roman Kenk and Elaine S. Vallière, ed. 1966 865 p refs Sponsored by NASA and AF

(NASA-CR-75597) CFSTI: HC \$11.64/MF \$4.00 CSCL 06S

Abstracts of aerospace medicine and biology literature for the years between 1958 and 1961 are presented in a reference book which combines the entries that previously appeared in volumes VII through X of *Aerospace Medicine and Biology: An Annotated Bibliography*. These abstracts are presented alphabetically by author under categories within the general headings of effects of environmental factors and stresses; personnel; medical problems and pharmacology; toxicology; safety, survival, and rescue; and man-machine integration and life support systems. M.W.R.

N66-27630# School of Aerospace Medicine, Brooks AFB, Tex. **POTASSIUM TRANSPORT MUTANT OF ESCHERICHIA COLI B. ANALYSIS OF POTASSIUM MOVEMENTS** Technical Report, Jun. 1964-Dec. 1965

Raymond Damadian Feb. 1966 20 p refs

(SAM-TR-66-19; AD-631205) CFSTI: HC \$1.00/MF \$0.50

A second mutant of *Escherichia coli* B (strain RD-2) with impaired K transport has been isolated with nitroguanidine as the mutagenic agent. Except for its K requirement, RD-2 manifests the same nutritional requirements as the parent strain and contrasts with RD-1, which was shown to be deficient both in K transport and in methionine biosynthesis (1). RD-2 will not grow in a low K media (20 μ M. K) which supports growth of the parent strain. Electron microscopic examination of the two strains reveals no differences in surface layer ultrastructure to account for the transport impairment. Potassium accumulation studies demonstrate that the mutant low K growth failure is attributable to a K accumulation impairment. In contrast to the parent strain, RD-2 cannot accumulate K from the low K media. Addition of K to a nonaccumulating low K suspension of RD-2 stimulates uptake of K, thus establishing viability of the cells. Measurement of low K steady-state tracer fluxes yields flux values for RD-2, which are one-third those of the parent strain, and the calculated influx rate constants are consistent with the interpretation that RD-2's accumulation failure is due to an influx impairment. Author (TAB)

N66-27639# Armed Forces Radiobiology Research Inst., Bethesda, Md.

INCAPACITATION IN THE MONKEY (*MACACA MULATTA*) FOLLOWING EXPOSURE TO A PULSE OF REACTOR RADIATIONS

Leslie J. Seigneur and James T. Brennan Feb. 1966 58 p refs (AFRRI-SR66-2; AD-631661) CFSTI: HC \$3.00/MF \$0.75

One hundred and thirty-one monkeys (*Macaca mulatta*) were exposed to scheduled doses of 2,500 through 80,000 rads of pulsed reactor radiations using a triga reactor. The animals were observed with respect to survival time, and time to

permanent complete incapacitation. Additional observations of a clinical nature were made during the postirradiation course. An early transient phase of incapacitation lasting from 5 to 30 minutes was noted at dose levels from 2,500 through 30,000 rads. This was followed by a 'plateau' of recovered ability to respond, the duration of the plateau being inversely related to dose. With scheduled doses in the range from 40,000 through 80,000 rads, the plateau phenomenon was suppressed, partial recovery did not usually occur, and the early incapacitation was rapid, progressive, and irreversible. The radiological physics and dosimetry support required for this experiment is reported in detail in AD-631 589.

Author (TAB)

N66-27641# School of Aerospace Medicine, Brooks AFB, Tex.

ALGAL BIOREGENERATIVE SYSTEMS Status Report, 1952-1964

Richard L. Miller and Calvin H. Ward Feb. 1966 28 p refs (SAM-TR-66-11; AD-631191) CFSTI: HC \$2.00/MF \$0.50

Algae may be used for partial regeneration of man's requirements for life in a closed environment. Feasibility has been demonstrated with model systems, but established principles of algal metabolism impose severe restrictions on the design of thermodynamically efficient, low-volume and low-weight algal gas exchangers. Review of available data on photosynthetic gas exchangers now permits verification of design parameters predicted almost 10 years ago. Experimentally achievable values of electrical efficiency are only a fraction of the theoretical, significant improvement over or attainment of theoretical values will require major improvement in the conversion of electrical energy into light energy or conversion of light energy into chemical energy by the green plant. Development of a basic design theory would be greatly simplified by a definite mission-oriented goal—e.g., a planetary base. At present there is no material advantage among existing algal exchangers since criteria used for design require compromises of weight, volume, and power. Most algal gas exchangers are inadequately described. More experimental data, obtained by extensive operation of prototype systems, are needed for accurate logistic evaluation. Weight, volume, and power flexibility may ultimately be of advantage in the design of life-support systems for specific space missions, provided long-term reliability can be demonstrated. Author (TAB)

N66-27644# Aviation Safety Engineering and Research, Phoenix, Ariz.

IMPACT TEST METHODS AND RETENTION HARNESS CRITERIA FOR U.S. ARMY AIRCREWMAN PROTECTIVE HEADGEAR Final Technical Report

Joseph L. Haley, Jr. and James W. Turnbow Fort Eustis, Va., Army Aviation Materiel Labs., Mar. 1966 55 p refs

(Contract DA-44-177-AMC-254(T))

(AvSER-65-15; USAAVLABS-TR-66-29; AD-631493)

On the basis of simple analyses and some experimental testing, recommendations are made for the design and testing of helmet retention harnesses. A 'collar-type' retention harness is recommended, and two tests are suggested as a method of insuring a good design. Impact tests were conducted by an impactor-drop method and a head-form drop method. These test methods employ one movable piece and one fixed piece rather than two movable pieces as are currently used by most test agencies. On the basis of the impact test results, it is recommended that the impactor-drop method be used for the qualification of U. S. Army aircrew helmets. Probable head impact velocities and impact surfaces are discussed, and impact test conditions are specified.

Author (TAB)

N66-27654# Northrop Space Labs., Hawthorne, Calif. Bio-astronautics Lab.

A STUDY OF FLUORESCENT PRODUCTS IN THE URINE OF RATS EXPOSED TO IONIZING RADIATION Formal Progress Report, 1 Nov. 1964-31 Oct. 1965

James A. Demetriou and Frank M. Maciasr Brooks AFB, Tex., School of Aerospace Med., Feb. 1966 20 p refs (Contract AF 41(609)-2679)

(SAM-TR-66-13; AD-631206) CFSTI: HC \$1.00/MF \$0.50

The excretion of fluorescent products in the urines of non-irradiated rats and rats exposed to a lethal dose of ionizing radiation was investigated. Fractionation of the urine extracts by gel filtration chromatography yielded eleven fluorescent fractions. Several fractions in the urines of the irradiated animals showed marked decreases in total fluorescence. A new fluorescent fraction was found exclusively in the post-irradiation urines. In addition, other differences between the irradiated and nonirradiated animals were found by means of thin-layer chromatography.

Author (TAB)

N66-27659# Boston Univ., Mass. School of Medicine. **FACTORS AFFECTING SURVIVAL DURING PROLONGED HYPOTHERMIA** Final Report, Feb. 1963-Apr. 1965

E. T. Angelakos Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 28 p refs

(Contract AF 33(657)-10755)

(AMRL-TR-65-182; AD-631440) CFSTI: HC \$2.00/MF \$0.50

The mortality of anesthetized dogs maintained under prolonged hypothermia was studied and the factors responsible for death were evaluated. In the technically acceptable experiments, 45% of the dogs maintained at moderate hypothermic temperatures $26^{\circ}\pm 1^{\circ}\text{C}$ died within 16 hours. The corresponding mortality in normothermic (38°C) control dogs was 7%. Progressive hemoconcentration and bradycardia were observed during prolonged hypothermia. The former could be abolished by splenectomy. The use of artificial pacemakers to limit the effects of bradycardia was unsuccessful due to the development of other cardiovascular complications. Blood catecholamine levels increased with cooling to 33°C but decreased below control levels at or below 25°C ; however, prolonged hypothermia at 25°C was associated with a progressive increase in blood catecholamines up to two to three times the initial control levels. The catecholamine content of aorta, kidney and spleen was not altered significantly by hypothermia, however, cardiac catecholamines decreased to below 50% of control with cooling to 25°C . Adrenergic mechanisms apparently play a key role in the alterations of cardiovascular functions which limit survival during prolonged hypothermia.

Author (TAB)

N66-27660# Armed Forces Radiobiology Research Inst., Bethesda, Md.

EXPERIMENTAL DETERMINATION OF DOSE FOR THE MONKEY IN A REACTOR PULSE ENVIRONMENT

J. H. Dowling Feb. 1966 39 p refs

(AFRR-SR66-3; AD-631589) CFSTI: HC \$2.00/MF \$0.50

A study was made of a series of pulse exposures of the monkey using a pulsing TRIGA reactor. The reported doses are based on the kerma calculated from threshold foil data for fast neutrons and the gamma exposure determined by silver activated glass rods. These values were compared with extrapolated (by monitoring sulfur) values determined using tissue equivalent ionization chambers for total dose, a Hurst proportional counter for fast neutron dose, and a graphite- CO_2 ionization chamber and a tetrachloroethylene chemical dosimeter for gamma dose.

Author (TAB)

N66-27667# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

VOLUMETRIC WORKSPACE STUDY. PART II: OPTIMUM WORKSPACE CONFIGURATION FOR USE OF WRENCHES Final Report

William N. Kama Dec. 1965 29 p ref

(AMRL-TDR-63-68 (II); AD-631476) CFSTI: HC \$2.00/MF \$0.50

The study was conducted to establish the functional relationship between available workspace and the time required to remove and to replace two self-locking hexagonal nuts. The experiment involved the following variables: (a) wrench type, a 6-inch long open-end or 7-inch long ratchet; (b) workspace depth, 15, 30, and 45 cm (6, 12, and 18 inches); (c) aperture size, 20, 25, 30, 35, and 40 cm (8, 10, 12, 14, and 16 inches); and (d) task location within the workspace (left side, right side, top, bottom, or rear). Twenty-one subjects were divided into three groups of seven subjects each. For a given group, depth was held constant as subjects using their right hand performed the task under 25 different conditions. These conditions were determined by the combination of five aperture sizes and five different task locations. The 25 conditions were performed twice, once using the open-end and once using the ratchet wrench. Major results of this study (within the range of conditions explored) are as follows. First, regardless of the type of wrench used, work times decreased as aperture size increased. However, increasing aperture size beyond 30 cm (12 inches) did not appreciably shorten work times. Work times using the ratchet wrench were considerably faster than those obtained with the open-end wrench. Second, the best overall performance times were obtained at the rear location. The next best times were obtained at the left side and bottom locations, while the right side and top locations yielded the worst times.

Author (TAB)

N66-27677# Southwest Research Inst., San Antonio, Tex. Dept. of Physical and Biological Sciences.

GAS CHROMATOGRAPHIC ANALYSIS OF BODY FLUIDS FOLLOWING MIDDLETHAL IRRADIATION Final Report

Arthur L. Gross and George K. Kibler 15 Dec. 1965 14 p (Contract AF 41(609)-2676)

(AD-631232) CFSTI: HC \$1.00/MF \$0.50

The program was organized to utilize existing gas chromatographic procedures in current use at the laboratories of Southwest Research Institute for screening a large number of chemical substances to determine what alterations result from radiation exposure. Rats were irradiated, blood or urine was collected from the animals, and gas chromatographic analyses were performed using three different methods. During the last quarterly period of the program monkeys were used as the experimental animals. They were irradiated and blood samples periodically taken from the animals were analyzed for amino acids.

TAB

N66-27680# Naval Air Development Center, Johnsville, Pa. **SOLID STATE MECHANISMS OF ION TRANSPORT IN BIOLOGICAL SYSTEMS**

Freeman W. Cope 31 Dec. 1965 17 p refs

(NADC-MR-6518; AD-631544) CFSTI: HC \$1.60/MF \$0.50

Leakage of Na^+ across the surface of muscle cells has been observed to obey the Elovich equation, which previously was found to describe various electron transport processes at surfaces of inorganic semiconductors. Analogies between solid state electron transport and liquid or gel state ion transport permit the derivation of the Elovich equation for Na^+ transport across the surface of the muscle cell, but only if it

is assumed that muscle Na^+ exists mostly in a complexed form. Direct experimental verification of this theoretical prediction was obtained by nuclear magnetic resonance analysis of muscle Na^+ . The similarities between the behavior of ions in cells and electrons in semiconductors suggest the presence of some degree of order of crystallinity in cells, which suggests the applicability to biology of concepts derived from the study of liquid crystals.

Author (TAB)

N66-27701# Oregon State Univ., Corvallis. Radiation Center. **EXPOSURES OF BIOLOGICAL SYSTEMS TO INORGANIC FLUORIDE OXIDIZING AGENTS. VOLUME I: HANDLING AND EXPOSURE TECHNIQUES**

Frank N. Dost, Donald J. Reed, and Chih H. Wang Wright-Patterson AFB, Ohio, Aerospace Med. Res. Labs., Dec. 1965 28 p refs

(Contract AF 33(615)-1799)

(AMRL-TR-65-223, Vol. I; AD-631483) CFSTI: HC \$2.00/MF \$0.50

A system adaptable for diluting and distributing various inorganic fluoride oxidizing agents was developed. Known dilutions of these agents in nitrogen air are generated on the basis of flow rate ratios between undiluted gas and various diluent gases, and confirmed chemically. Problems of materials compatibility, personnel protection, stability of the agents and exposure system design are discussed. Author (TAB)

N66-27703# Cincinnati Univ., Ohio.

AN EVALUATION OF PROGRAMED INSTRUCTION FOR TEACHING FACTS AND CONCEPTS Final Report, Apr. 1964-Aug. 1965

James N. Jacobs (Cincinnati Public School System), Kirk A. Johnson, and John S. Abma (Aerospace Med. Res. Labs.) Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 34 p refs (Contract AF 33(657)-10234)

(AMRL-TR-65-222; AD-631414) CFSTI: HC \$3.60/MF \$0.50

The study evaluated five methods of teaching an academic topic ('Bill of Rights') to high school classes. The five methods were: (1) linear program in class, (2) linear program as homework plus discussion in class, (3) text version of linear program in class, (4) text version of linear program as homework plus discussion in class, and (5) conventional lecture-discussion method in class. The linear program alone provided the best results when measured both for the learning of factual material and general concepts about the topic. The linear program was best for high, intermediate, and lower levels of scholastic aptitude. Author (TAB)

N66-27706# School of Aerospace Medicine, Brooks AFB, Tex.

AN ECONOMICAL TIME STANDARD FOR CALIBRATING CARDIOTACHOMETERS AND BIOLOGIC DATA RECORDINGS, 10 AUGUST-1 DECEMBER 1965

Alfonso Angelone Feb. 1966 17 p refs

(SAM-TR-66-10; AD-631197) CFSTI: HC \$1.00/MF \$0.50

A single-stage pulse-frequency divider is reported which will divide 60 pulses/sec by 60 yielding 1-second pulses with reliability from -40 to $+80^\circ\text{C}$. Division by 300, yielding pulses at 5-second intervals, is reliable from $+5$ to $+45^\circ\text{C}$. A triple-division circuit is then developed from the single-stage divider concepts. This circuit is incorporated into a calibration instrument which produces pulses in a frequency range useful for time calibration of biological data. When the instrument is used as a cardiometer calibrator, pulses are available from 30 to 300 pulses/min; as a time

marker, periods range from 50 msec to 10 sec. The circuitry remains stable over a line voltage fluctuation of $\pm 20\%$ and a temperature range of -15 to $+80^\circ\text{C}$. The output pulse, available as either a negative or positive going pulse, is 8.33 msec wide, has an amplitude greater than 10 v, has rise and fall times of the order of 10 microsec, and exhibits a typical timing accuracy of $\pm 0.02\%$. Author (TAB)

N66-27709# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DEVICE FOR BIOELECTRICALLY CONTROLLING, E.G., OF PROTHESES

Ye. P. Polyak 19 Aug. 1965 6 p Transl. into ENGLISH from Russian patent no. 163326 (Appl. no. 843963/31-16, 27 Jul. 1963) 2 p

(FTD-TT-65-508/1+2+4; AD-620857) CFSTI: HC \$1.00/MF \$0.50

The object of the invention is a device for bioelectrically controlling, for example prostheses, having resistor, capacitor, and transistors, and which is characterized by the fact that, for the purpose of assuring subsequent control of two pairs of movements from two independent signal sources, an electronic switch-relay is mounted in it, built on two transistors, being activated at simultaneous feeding of two signals of negative polarity and switching over the control from one pair of movement to another. For the purpose of controlling the second pair of movements, an RC (circuit), which maintains the circuit in switched over condition for a period of time necessary to execute the beginning of the movement, and automatically returning the circuit into initial position when the feeding of the control signal has been discontinued. Author (TAB)

N66-27787# Bureau of Social Science Research, Inc., Washington, D. C.

VOLUNTEERS FOR A HIGH RISK SPORT

Samuel Z. Klausner Jan. 1966 44 p refs

(Contract AF 49(638)-1510)

(AFOSR-66-0121; AD-631049) CFSTI: HC \$2.00/MF \$0.50

Sport parachutists tend to be over-represented in the Western region of the United States. They are, by and large, relatively young males who look upon the sport as a masculine expression. The sport is objectively dangerous, as measured by the accident rate, and is subjectively perceived as such. Sport parachutists tend to be single-minded in their attitude to the sport, sometimes giving it priority over their commitment to family roles. Press reportage emphasizes the spectacular and exhibitionistic aspects of parachuting rather than its competitive sport aspects. Newspapers see the activity as exhibiting fun and 'guts' and as dangerous. Author (TAB)

N66-27754*# Pennsylvania State Univ., University Park. Dept. of Biophysics.

SUPPRESSION OF NONSENSE BY REVERTANT BACTERIA

Stanley Person, Stephen Phillips, Fred Funk, and Mary Osborn [1965] 11 p refs

(Grants NSG-324; NSF GB-4485)

(NASA-CR-75489) CFSTI: HC \$1.00/MF \$0.50 CSCL 06M

Experiments were performed to test the ability of revertant bacteria of *E. coli* WWU, produced by ultraviolet and ionizing radiations and by uracil- 5H^3 radioactive decays, to suppress T4 amber B22. The results, which are tabulated, show that the percentage of revertants which can suppress B22 is dependent on the mutagenic agent. For cells irradiated in the liquid state with ionizing radiation, 55% of the revertants formed are su^+ . For cells irradiated in the frozen state and

in the presence of catalase, the percentage of revertants that can suppress amber B22 is increased to 76 and 74%, respectively. About 83% of the revertants produced by ultraviolet light can suppress B22. The most interesting result is that all revertants produced by uracil-5H³ decay are su⁺ for B22. The finding that some arginine revertants of WWU suppress T4 amber mutant whereas the parent WWU does not, indicates that the original mutational alteration preventing the formation of arginine is a nonsense codon and that reversion sometimes occurs by an alteration outside the structural gene. Since the percentage of revertants that can suppress one amber varies according to the mutagenic treatment given, it is concluded that the events leading to reversion with ultraviolet light, ionizing radiation, and uracil-5H³ decay are not identical.

R.N.A.

N66-27756* Beckman Instruments, Inc., Fullerton, Calif. Advanced Technology Operations.

RESEARCH INVESTIGATION OF ELECTRICAL DISCHARGE FRAGMENTATION FOR PROTEIN STRUCTURE IDENTIFICATION Final Report

Irwin Krull and James Sternberg 29 Apr. 1966 28 p refs (Contract NAS2-3193)

(NASA-CR-75499) CFSTI: HC \$2.00/MF \$0.50 CSCL 06B

In this study an electrical discharge fragmentation device has been successfully applied to the determination of fragmentation patterns for eleven species of bacteria. Operating parameters studied include the effects of discharge current, discharge gas composition and the choice of chromatographic column on the patterns obtained. Procedures were developed for obtaining highly reproducible retention times. It was found that the greatest differences in patterns for different bacteria occur in fragments which can be lost even under conditions of mild heating (to 250°C) and purging before fragmentation, the instrument and procedure were accordingly modified to prevent this loss, and distinguishable patterns were then obtained for the eleven species of bacteria studied. It has been found that approximately 10 peaks can be labelled as stemming from protein substances.

Author

N66-27778# Masonic Medical Research Lab., Utica, N. Y. **A STUDY OF THE EFFECTS OF AGE AND IONIZING RADIATION OF NUCLEIC ACID METABOLISM AND PROTEIN SYNTHESIS IN VISCERAL AND CENTRAL NERVOUS SYSTEM TISSUES** Technical Progress Report.

15 Mar. 1965-1 Jan. 1966

Verner J. Wulff [1966] 11 p refs

(Contract AT(30-1)-3518)

(TID-22591) CFSTI: HC \$1.00/MF \$0.50

The metabolism of ribonucleic acid in the liver of young and adult rats was studied after the intraperitoneal injection of ³H-cytidine one hr prior to killing. The RNA and DNA content of liver nuclei from young and old rats was determined. The turnover of RNA in liver nuclei was measured *in vitro* in diced liver obtained after administration of ³H-cytidine or ³H-orotic acid to intact animals. Labeling techniques using ³H-orotic acid or ³H-cytidine were developed for use in studies of RNA metabolism in the brain of young and old rats. Preliminary results are included from studies of RNA metabolism in parabiotic rats.

NSA

N66-27795# Johns Hopkins Univ., Baltimore, Md. Dept. of Statistics.

RECOMBINATION OF A POOL OF DNA FRAGMENTS WITH COMPLEMENTARY SINGLE-CHAIN ENDS

G. S. Watson, W. K. Smith, and C. A. Thomas Feb. 1966 10 p Submitted for Publication

(Contract Nonr-4010(09); Grants NSF G-10726; NIH GM-1237-02)

(TR-47; AD-631036) CFSTI: HC \$1.10/MF \$0.50

A model for Genetic Recombination in bacteriophage is presented. The DNA molecules in the pool are broken into fragments randomly, enzymes attack the 3'-ends of the fragments, the exposed bases seek complementary sequences on other fragments and new molecules are reassembled. Formulae are given for the ratio of output to input molecules and for the recombination rate and the length of the genetic map.

Author (TAB)

N66-27796# Naval Radiological Defense Lab., San Francisco, Calif.

RADIATION-INDUCED FREE POLYDEOXYRIBONUCLEOTIDES IN LYMPHOID TISSUES: A PRODUCT OF THE ACTION OF DEOXYRIBONUCLEASE I

Karl F. Swingle and Leonard J. Cole 1 Mar. 1966 24 p refs (USNRDL-TR-983; AD-631144) CFSTI: HC \$2.60/MF \$0.50

Physico-chemical studies on the saline-extractable poly-deoxyribonucleotides (PDN) occurring in lymphoid tissues 4 hours after whole-body exposure to 600 rads X-irradiation revealed the following information: (1) Viscosity, precipitability by acids and alcohols, and behavior on gel-filtration columns suggest a molecular weight less than that of undegraded DNA but probably greater than 100,000. (2) Thermal transition curves indicate extensive complementary double stranding with slight 'fraying' of the ends of the strands. (3) In 0.2 M NaCl, PDN has a lower affinity for histone than does DNA. (4) Susceptibility of PDN to the action of venom phosphodiesterase (EC 3.1.4.1) and resistance to spleen phosphodiesterase (EC 3.1.4.1) demonstrate the presence of 3'-hydroxyl terminals and the absence of 5'-hydroxyl terminals. (5) The above observations suggest that PDN was formed from DNA by the action of a deoxyribonuclease I-like (EC 3.1.4.5) endonuclease rather than a deoxyribonuclease II-like (EC 3.1.5.6) endonuclease in the irradiated tissue.

Author (TAB)

N66-27812# Naval Radiological Defense Lab., San Francisco, Calif.

THE DNA CONTENT OF MITOTIC NUCLEI OF TWO MOUSE TUMORS

Edward L. Alpen and Muriel E. Johnston 3 Mar. 1966 18 p refs

(USNRDL-TR-986; AD-631145) CFSTI: HC \$1.60/MF \$0.50

A new high-precision microspectrophotometric method was used to test the validity of the 'DNA constancy hypothesis' in two mammalian tumor lines. The two are the mouse ascitic tumor BP-8 and the *in vitro* mouse leukemic cell line, L5178Y. It was shown that the mitotic nuclei of these cells have a DNA content with a coefficient of variation of 5-6%. The instrumental and measurement errors are 4-5%; thus the variability of DNA content as measured by absorption of Feulgen stain is 1% or less. Author (TAB)

N66-27817# Martin Co., Baltimore, Md. Research Inst. for Advanced Studies.

BASIC RESEARCH IN PHOTOSYNTHESIS Final Report, 1 Oct. 1960-31 Dec. 1965

Bessel Kok [1966] 9 p refs

(Contract AT 49(638)-947)

(AFOSR-66-0602; AD-630524) CFSTI: HC \$1.10/MF \$0.50

Instrumentation and methodology were developed in the areas of mass spectrometry, sensitive spectroscopy, polarography (oxygen exchange), and techniques for irradiating photosynthetic materials with high intensity monochromatic light. Oxygen uptake could be decreased on wavelength of illumination. Photosystem I was sensitized predominantly by long-wave illumination, with suppression of respiratory uptake. Photosystem II, with inducement of increased oxygen

uptake key shortwave illumination, was not explained fully. A longwave chlorophyll component (P700) was detected in the chloroplast which occurs in the low concentration of 1 per 100 total chlorophylls. In the primary event of photosystem I, P700, upon excitation must lose an electron to an associated reaction partner. In complete photosynthesis, the P700 is re-reduced by photosystem II. In a study with a mutant of *Scenedesmus*, the reducing power generated in photosystem II, simultaneous with oxygen, was not lower than +0.18 volts. TAB

N66-27822# Naval Civil Engineering Lab., Port Hueneme, Calif.

DEEP-OCEAN BIODETERIORATION OF MATERIALS. PART III: THREE YEARS AT 5,300 FEET Technical Report, Mar. 1962-Jun. 1965

James S. Muraoka Feb. 1966 53 p refs

(R-428; AD-631078) CFSTI: HC \$3.00/MF \$0.50

The report covers data obtained after exposing 1,318 test specimens of 316 different materials for 35 months on the Pacific Ocean floor at a depth of 5,300 feet. The materials were attached to a Submersible Test Unit (STU). The STU was retrieved in February 1965 and returned to the Laboratory for tests and analyses. Hydroid growths were found on all the test specimens placed on the STU. A few species of tube worms were found attached to metals, plastics, and coated test specimens. Most of the plastics and all the rope materials were covered with bacterial slime growth. Cotton and Manila rope specimens were severely deteriorated by bacterial action. Wood panels, plastics, and Manila ropes were attacked by marine borers. Metals, natural and butyl rubber, and certain plastic materials were not affected. Author (TAB)

N66-27860# Miami Valley Hospital, Dayton, Ohio. Dept. of Research.

THE METABOLIC ACTIVITY OF INTACT CELL DISPERSATES FROM NORMAL AND OXYGEN INTOXICATED RATS Final Report, 1 Feb. 1963-30 Jun. 1964 Bernard J. Katchman, Marcia L. Collins, and George M. Homer Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 56 p refs

(Contract AF 33(657)-9843)

(AMRL-TR-65-173; AD-630594) CFSTI: HC \$3.00/MF \$0.50

Methodology for the preparation of intact tissue dispersates was investigated. The metabolic behavior of liver cell dispersates was examined and an assay system suitable to evaluate metabolic activity effected. Metabolic alterations induced in animals exposed to 98-99% O₂ at 1/3 and at 1 atmosphere have been investigated. Intact liver cell dispersates derived from rats exposed to O₂ environments (1 atmosphere) for periods up to death show 40% greater respiratory activity than control rats. In addition, the livers from these O₂ intoxicated animals showed decreased mass, decreased cell size, and an increase in total nitrogen. These effects were not time dependent. The only effect noted in animals exposed at 1/3 atmosphere of 98-99% O₂ was a decrease in liver mass. The significance of these results in O₂ intoxication is discussed. Author (TAB)

N66-27862# Geoscience, Ltd., La Jolla, Calif.

THERMAL AND ELECTRICAL CONDUCTIVITIES OF BIOLOGICAL FLUIDS AND TISSUES Annual Report, 1 Apr. 1965-31 Mar. 1966

Heinz F. Poppendiek, Norman D. Greene, W. A. Morton, P. M. Morehouse, R. Randall et al 31 Mar. 1966 43 p refs

(Contract Nonr-4095(00))

(GLR-43; AD-630712) CFSTI: HC \$2.00/MF \$0.50

The objective of the research program has been the experimental and analytical determination and correlation of

thermal and electrical conductivities of biological fluids and tissues both under normal and stressed conditions. The stressing consists of freeze-thaw processes at slow and rapid rates. A second objective of the program has been to establish the relations between changes in these physical properties of biological specimens and the physical stresses imposed upon them.

Author (TAB)

N66-27867# Naval Medical Field Research Lab., Camp Le Jeune, N. C.

IMPROVEMENTS IN RECORDING HEART RATE DURING EXERCISE IN THE PERSPIRING SUBJECT

W. G. Holcomb (Airborne Instr. Labs.) Feb. 1966 21 p refs

/ts Interim Rept., Vol. XVI, No. 4

(MF022.03.04-8002.4; AD-631142) CFSTI: HC \$2.60/MF \$0.50

Electrodes manufactured by Naval Medical Field Research Laboratory (NMFRL) were compared with those manufactured by Beckman Instruments Company for the purpose of obtaining heart rates during vigorous activity (treadmill walking) under conditions of high temperature and humidity. Also, use of the Ace (R) bandage to secure the electrodes in place was compared with use of the Beckman adhesive fastener. The electrodes manufactured by NMFRL performed as well as did those manufactured by Beckman Instruments. The adhesive fastener presented advantages over the Ace (R) bandage, but a longitudinal study is required to determine whether its use over a period of time will result in dermatologic problems. The analog presentation of heart rate data presented several advantages over previous techniques.

Author (TAB)

N66-27868# Bureau of Social Science Research, Inc., Washington, D. C.

THE IMPACT OF THE MEANS OF RECRUITMENT ON PERFORMANCE IN A DANGEROUS SPORT: SOCIAL, ENTHUSIASTIC AND EXHIBITIONIST SKYDIVERS Technical Report, 1963-1966

Samuel Z. Klausner Jan. 1966 32 p refs

(Contract AF 49(638)-1510)

(AFOSR-66-0122; AD-631019) CFSTI: HC \$2.00/MF \$0.50

Many skydivers are recruited by friends; relatively few are recruited through the mass media. Written materials are likely to attract older and more educated individuals to the sport. Individuals recruited by their friends tend to place the social group ahead of the sport and may shift to another sport rather than change their group when faced with a choice. Those who are recruited through written materials tend to be more active and enthusiastic skydivers. Those recruited through television are more interested in the exhibitionistic aspects of skydiving and, in their personalities, tend to be more passive. Those recruited by friends are more likely to be 'locals', concerned with the activity of their immediate skydiving group, while those recruited through the mass media are more likely to be 'cosmopolitans', concerned with national aspects of skydiving. Author (TAB)

N66-27906# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A METHOD FOR THE SIMULTANEOUS REGISTRATION OF SOME INDICES OF THE ACTIVITY OF THE SALIVARY GLAND

N. Y. Vakolyuk 21 Jan. 1966 7 p Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 9, no. 6, 1963 p 829-830

(FTD-TT-65-1520/1+2+4; AD-630993) CFSTI: HC \$1.10/MF \$0.50

A hermetically sealed system, with an internal thermocouple, for the electrographic registration and measurement of saliva droplets is described. The parameters of principle interest are temperature oscillations and bioelectric potentials. A tube fastened to the inside of the cheek conducts the saliva into the system, wherein the registration and measurements are performed.

D.T.

N66-27964* # Naval School of Aviation Medicine, Pensacola, Fla.

THOUSAND AVIATOR STUDY: NONVESTIBULAR CONTRIBUTIONS TO POSTURAL EQUILIBRIUM FUNCTIONS
Alfred R. Fregly, Albert Oberman, Ashton Graybiel, and Robert E. Mitchell 17 Mar. 1966 19 p refs

(NASA Order R-136)

(NASA-CR-75520; NAMI-956) CFSTI: HC \$1.00/MF \$0.50 CSCL 06N

In a preliminary study of nonvestibular sources of variance in the postural equilibrium functioning of a group of middle-aged males, twenty-eight of thirty-eight selected measures have been shown to be related to one or another of three postural criteria. Outstanding among these, in descending order of magnitude, are: abdominal circumference, age, endomorphy, heart rate immediately after exercise, and duration of cigarette smoking. These and other findings are discussed in terms of their implications for vestibular and gerontological research.

Author

N66-27968# Joint Publications Research Service, Washington, D. C.

PHYSIOLOGICAL PRINCIPLES OF CONDITIONING OF A HUMAN ORGANISM

M. Ye. Marshak 6 Jun. 1966 151 p refs Transl. into ENGLISH of the book "Fiziologicheskiye Osnovy Zakalivaniya Organizma Cheloveka" Leningrad, Meditsina Publishing House, 1965 2d ed. p 1-151

(JPRS-35864; TT-66-32298) CFSTI: \$4.00

Consideration is given to physiological changes which occur in the human organism as a result of adaptation to various cold, heat, altitude, and atmospheric pressure conditions. Summaries are presented of various experiments which indicate the ability of the organism to develop increased resistance to environmental factors different from the usual norms. Chapters of the text deal with the effects of exposure to local and generalized cooling of long periods, and the increase in resistance to cold exhibited by patients with pulmonary tuberculosis. Repeated exposure to high external temperatures, reduced atmospheric pressures, and high altitudes are considered. Hypoxic phenomena during muscular work and the effect of hypocapnia in hypoxia are also discussed. Certain rules are developed which are considered to govern the adaptation of the organism to adverse conditions, and the principles for creating an adaptation regime are discussed.

M.W.R.

N66-28007* # National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY, APRIL 1966

May 1966 168 p refs

(NASA-SP-7011(24)) CFSTI: HC \$1.00/MF \$1.00 CSCL 06S

An annotated bibliography on aerospace medicine and biology is presented along with subject, corporate source, and personal author indices. Included are references on the biological, physiological, psychological, and environmental effects to which man is subjected during the following simulated or actual flight in the earth's atmosphere or in

interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention.

R.N.A.

N66-28113# Bolt, Beranek, and Newman, Inc., Van Nuys, Calif.

ANALYSIS OF COMMUNITY AND AIRPORT RELATIONSHIPS/NOISE ABATEMENT Final Technical Report, May 1964-Apr. 1965

Dwight E. Bishop et al Dec. 1965 385 p refs

(Contract FA-WA-4409)

(SRDS-RD-65-130)

This report describes research directed towards gaining an understanding of why and how individuals and communities react to noise, and toward determining feasibility of developing improved methods for predicting community response to noise. Also presented are results of acceptability judgment tests in the vicinity of Los Angeles International Airport applications of a decision-flow methodology to analysis of seventeen case histories of community-decision making, noise reduction measurements made in a number of school, motel, and residential rooms, computer studies of noise environment generated by jet takeoffs, factors determining the duration of takeoff and flyover noise signals, and some applications of methods for determining land use compatibility with aircraft noise.

Author

N66-28131# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

STUDY OF THE METABOLISM OF THE OXYGEN COMPOUNDS OF IODINE: IODATE AND PERIODATE (I-131) [ESTUDIO DEL METABOLISMO DE LAS OXISALES DE IODO: IODATO Y PERIODATO (I-131)]

L. J. Anghileri 1965 14 p refs In SPANISH

(CNEA-164) CFSTI: HC \$1.00/MF \$0.50

This study was performed on the metabolism of iodate and periodate labelled with iodine-131. Rats were injected with the radioiodates, sacrificed at various intervals, and the activity of their organs and tissues determined by means of a scintillation counter. The organs were then homogenized, centrifuged, and chromatographically analyzed. In other rats, the whole body activity was measured to determine the elimination rate of the radioactive injection. Values of the specific activity and the percentages of injected activity present at various times in the different organs and tissues for both iodates are tabulated and discussed. The results give an idea of the elimination mechanism of the iodates. Except for the localized reduction mechanism in the liver, the elimination corresponds to that of iodine which is almost fully accomplished at the level of the gastric mucous. The low percentages observed in the various organs can be considered as the result of the small amount of radioiodate injected, its rapid elimination, and the general distribution of the iodates throughout the organism.

Transl. by R.N.A.

N66-28140# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

KIDNEY SCINTILLATION COUNTER [CENTELLOGRAFIA DEL RINON]

A. J. Olivari, V. Pecorini, A. Chwojnik, H. Garcia Del Rio, and H. Testa 1966 21 p refs In SPANISH

(CNEA-170) CFSTI: HC \$1.00/MF \$0.50

Renal scintillography is a new technique which expands the possibilities of studying the physiopathology of the kidney. It is also an attractive method for studying cysts, tumors, and congenital anomalies, and can obtain valuable information on the functional capacity of an organ. The radionuclides, equipment and methods, radiation dose, and the interpretation of the scintillograms, including some examples, are discussed. Transl. by R.N.A.

N66-28156# National Research Council of Canada, Ottawa (Ontario). Low Temperature Section.

A BIOLOGICAL HEAT EXCHANGER FOR BRAIN COOLING

T. R. Ringer and E. W. Peterson Apr. 1966 22 p refs (DME-Misc.-38) CFSTI: HC \$1.00/MF \$0.50

Consequent to the fact that the metabolic rate of brain tissue is proportional to its temperature, and additionally, that the central nervous system can withstand much lower temperatures than the heart, a system for the selective cooling of the brain was designed. A stainless steel helical heat exchanger, based upon this design, was developed, and then tested over a two year period. Using the exchanger in experimental brain surgery, temperatures of 5°C were obtained, with the blood supply to the brain subsequently occluded for periods of one hour with recovery. D.T.

N66-28160# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THERMAL RADIATION IN THE INVESTIGATION OF CUTANEOUS VASOMOTOR AND SUDOMOTOR CONTROL
D. Mc K. Kerslake Sep. 1964 25 p refs (FPRC/1226) CFSTI: HC \$1.00/MF \$0.50

The use of thermal radiation as a stimulus in the study of thermoregulatory responses is reviewed. It has proved of particular value in the investigation of reflexes depending on cutaneous afferent systems. Some conclusions are drawn about the nature of the sensitivity of the cutaneous receptors concerned, and the nervous pathways involved.

Author

N66-28165# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

ATTEMPTS AT BIOPHYSICAL SCHEMATIZATION [TENTATIVI DI SCHEMATIZZAZIONE BIOFISICA]

M. Ageno 10 Mar. 1966 31 p In ITALIAN; ENGLISH summary (ISS-66/10) CFSTI: HC \$2.00/MF \$0.50

In efforts toward biophysical schematizations the following are discussed: (1) the importance of the electron microscope for biological research; (2) cell division and reproduction, biological functions of cells, and isolated cells; and (3) molecular formations, interactions, structures, and groups, transport phenomena, and macromolecules. Also mentioned are single and multi-cell organisms, amino acids, ribonucleic acid, tissue, and resonance exchange. Transl. by D.T.

N66-28166# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

POSSIBLE RADIOACTIVE CONTAMINATION OF MAN AND HIS ENVIRONMENT BY THE USE OF NUCLEAR POWER IN SPACE [MOGELIJKE RADIOACTIEVE BESMETTING VAN DE MENS EN ZIJN OMGEVING DOOR HET GEBRUIK VAN KERN-ENERGIE IN DE RUIMTEVAART]

J. F. Bleichrodt and Johannes Blok Jan. 1966 32 p refs In DUTCH; ENGLISH summary (MBL-1966-1; TDCK-45102) CFSTI: HC \$2.00/MF \$0.50

This paper reviews the possibilities of radioactive contamination of man and his environment by the use of nuclear

power in space vehicles. Methods for the estimation of radiation dose after burn-up of satellites during reentry into the atmosphere are given. After complete burn-up of a thermoelectric generator fueled with ^{90}Sr , ^{137}Cs or ^{238}Pu the radioactive material will be spread in the atmosphere and gradually reach the surface of the earth giving rise to irradiation of gonads, bone and bone marrow of the world population. The order of magnitude of the radiation dose these organs are exposed to is estimated at 1 mrad per kW of thermal power of the generator. Burn-up of a nuclear reactor after operation during one year at a power level of 10 MW will result in doses of 0.04; 0.33 and 0.11 mrad in gonads, bone and bone marrow respectively. Calculations were based on the assumption that the radioactive particles are soluble in body fluids. Insoluble particles may result in an inhomogeneous dose distribution in the lungs. It is not certain therefore that the calculated doses are the only criteria needed to appreciate the risks involved. Author

N66-28168# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

DISTRIBUTION OF COLLOIDAL CHROMIC PHOSPHATE (P-32) IN RATS INFLUENCED BY THE SIZE OF THE PARTICLES [LA DISTRIBUCION DEL FOSFATO CROMICO COLOIDAL (P-32) EN RATONES INFLUENCIA DEL TAMAÑO DE LAS PARTICULAS]

L. J. Anghileri 1965 29 p refs In SPANISH (CNEA-158) CFSTI: HC \$2.00/MF \$0.50

A study was conducted to determine the effect of particle size on the distribution of chromic phosphate colloid solutions in rats after injections by three means, intravenous, intramuscular, and intracavity. The salient characteristics of the distinct types of colloids studied are described with respect to their fixation or retention by the various organs and tissues. In general, the colloid characteristics are similar with respect to their in vivo distribution which is largely conditioned by the size of the particles and by the means of injection. The distribution of the colloid particles is complex and various factors can alter the general scheme. The principal organ that captures the colloid is the liver and its activity decreases the size of the colloid particles. Based on the difference in the structure of the types of colloidal chromic phosphate, the distribution in the organism is affected in the case of the various colloids studied, at the posterior duration in vivo of the complex chrom-gelatin phosphate. This supposition explains the alternate observations in their distribution and elimination not already affected by particle size. Transl. by R.N.A.

N66-28179# Brussels Univ. (Belgium).

NUCLEAR MEDICINE [MEDECINE NUCLEAIRE] Annual Report, 1964

Brussels, EURATOM, 1966 68 p refs In FRENCH and ITALIAN; ENGLISH summary Prepared jointly with Pisa Univ. (Contract EURATOM-026-63-4 BIAC) (EUR-2636.f.i) CFSTI: HC \$3.00/MF \$0.75

Theoretical and experimental studies are reported in a large number of fields related to nuclear medicine. Blood changes, tumor development, and circulatory and metabolic disorders caused by radiation are discussed. Cerebral blood-flow rate measurements following exposure to krypton 85, a dynamic model for iodine metabolism, and behavior of kidneys after iodine 131 exposure are investigated. Measurement is made of intestinal absorption of the triglycerides, albumin, and xylose; and determination is made of neutron activation of ionic composition in children. M.W.R.

N66-28203# Flying Personnel Research Committee, London (England).

THE EFFECT OF POSITIVE ACCELERATION ON THE INEQUALITY OF VENTILATION AND PERFUSION IN THE LUNG

D. H. Glaister (RAF Inst. of Aviation Med.) Sep. 1964 29 p refs

(FPRC/1231) CFSTI: HC \$2.00/MF \$0.50

The distribution of ventilation and blood flow in the human lung has been studied by means of continuous analysis of expired air for CO₂ and, following a single breath of pure O₂ for N₂. At rest, the concentrations of CO₂ and N₂ both rose slowly and steadily throughout the expiration. During positive acceleration at 1.4-3.0 'g', the N₂ concentration rose more steeply, but CO₂ was either unaffected or its concentration fell towards the end of the expiration. At 3.0 'g', up to one third of the total ventilated lung volume was shown to be unperfused. This region is probably the upper lung where the gravitational reduction in blood flow will be most marked. The sudden production of an inequality in the distribution of ventilation and perfusion, as by acceleration, results in a temporary decrease in pulmonary gas exchange and in a lasting reduction in the O₂ saturation of arterial blood. The mechanism by which positive acceleration could produce changes in the distribution of ventilation and perfusion is discussed, together with the significance of these changes in relation to the lung collapse which may occur when O₂ is breathed during acceleration. Author

N66-28214# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

RESEARCHES ON THE ETIOLOGICAL AGENT OF VIRAL HEPATITIS AND OF THE CHANGES IN THE FINE STRUCTURE OF THE HEPATIC CELLS WHICH TAKE PLACE DURING THE INFECTION [PRESENZA DI ELEMENTI VIRUS-SIMILI NELLE CELLULE EPATICHE DI PAZIENTI AFFETTI DA EPATITE VIRALE]

B. Babudieri, E. Fiaschi, R. Naccarato, G. Papa, and L. A. Scuro (Padua Univ.) 5 Oct. 1965 24 p refs
(ISS-65/38) CFSTI: HC \$2.00/MF \$0.50

Characteristic of the liver cell during the course of viral hepatitis is the large number of ribosomes, which either form clusters or are arranged in more parallel lines, with regular intervals between the granules. In ten patients the cytoplasm "saccula," surrounded by a monolayer membrane and containing round virus-like particles, with a diameter of about 200 Å was observed. These saccula correspond in size and appearance to fluorescent areas observed after treatment of human infected liver cells with gamma globulins, from convalescents from viral hepatitis, conjugated with fluorescein isothiocyanate. In liver sections treated with ferritin-labelled specific gamma globulins, some clumps of ferritin granules were observed, probably surrounding the virus-like bodies. The authors believe that these bodies could correspond to the agent of human viral hepatitis. Author

N66-28218# Österreichische Studiengesellschaft für Atomenergie G.m.b.H., Seibersdorf (Austria).

THE DETERMINATION OF IODINE IN TOTAL SERUM AND IN ALBUMIN SERUM WITH NEUTRON ACTIVATION ANALYSIS [ZUR BESTIMMUNG VON JOD IM GESAMTSERUM UND IM SERUMEIWEISS MIT DER NEUTRONENAKTIVIERUNGS-ANALYSE]

H. Frischaut and H. Altmann 1966 10 p refs In GERMAN Presented at 7th Intern. Symp. on Radioactive Isotopes in Medicine and Research, Bad Gastein, Austria Submitted for Publication

(SGAE-BL-18/1966) CFSTI: HC \$1.00/MF \$0.50

Iodine was separated from the serum and from the albumin precipitation of the serum by burning in oxygen. A platinum basket held the sample and served as catalyst. The free iodine was transferred to a benzene phase, which was washed with a NaCl-containing water solution. Activation was measured with a gamma spectrometer and was followed by chemical analysis. The method was found to be simple, fast, and suitable for iodine determination in biological material or tissue. Transl. by K.W.

N66-28228# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

LIPID GLOBULES IN OSTEOGENIC CELLS. A HISTOCHEMICAL AND ELECTRON-MICROSCOPIC INVESTIGATION

E. Bonucci (Pisa Univ.) 5 Oct. 1965 25 p refs Sponsored by the Consiglio Nazl. Delle Ric.

(ISS-65/36) CFSTI: HC \$1.00/MF \$0.50

A histochemical and electron microscopic study of cells involved in membranous ossification (with special reference to lipid globules) is presented. The results suggest that the acquisition of a high rate of synthesizing activity may be connected with glycogen and lipid depletion. The significance of this is discussed. Author

N66-28240# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

ELECTRON MICROSCOPE STUDY OF CHONDROSTAGON HAEMATICUM

B. Babudieri and F. Tangucci 5 Oct. 1965 20 p ref Sponsored by the Consiglio Nazl. Delle Ric.

(ISS-65/39) CFSTI: HC \$1.00/MF \$0.50

The fine morphology of a parasite of the red blood cells of *Hydromantes italicus* has been studied in the electron microscope. This parasite, named *Chondrostagon haematicum*, has the particular morphological characteristics of the *Mycoplasmata*. Author

N66-28259# Illinois Univ., Urbana. Group Effectiveness Research Lab.

THE EFFECTS OF INTER-GROUP COMPETITION IN QUASI-THERAPEUTIC LEADERS ON THE ADJUSTMENT OF SMALL MILITARY GROUPS

Doyle W. Bishop, James M. Alsobrook, and Fred E. Fiedler Jan. 1966 43 p refs

(Contract DA-49-193-MD-2060)

(TR-20; AD-631741) CFSTI: HC \$2.00/MF \$0.50

The study investigated the effects of two variables (inter-squad competition vs. non-competition, and quasi-therapeutic vs. non-therapeutic squad leaders) on the adjustment, interpersonal relations, and task effectiveness of military squads. The covariance control variables were the dependent variable's own pretest counterpart and a measure of trainees' perceived harassment. The major results were: (1) The competitive activity and the manner in which it was implemented by the cadre of the experimental companies significantly increased perceptions of harassment by trainees in the competitive squads. (2) When perceived harassment was statistically controlled by analysis of covariance, the adjustment and task effectiveness of the competitive squads improved significantly relative to the control squads. The improved adjustment appeared to be primarily in the task-related areas. No improvement in interpersonal relations was found for the competitive squads. (3) No reliable main effects were found for the quasi-therapeutic leader manipulation. (4) Some interactive effects of competition and quasi-therapeutic leadership were found. Author (TAB)

N66-28271# System Research, Ltd., Richmond (England).
**RESEARCH ON CYBERNETIC INVESTIGATION OF
 LEARNING AND PERCEPTION Annual Summary Report
 No. 3**

Gordon Pask, M. Elstob, and George L. Mallen 15 Feb. 1966
 104 p refs

(Contract AF 61(052)-640)

(AFOSR-66-0644; AD-631634) CFSTI: HC \$4.00/MF \$0.75

Research is summarized on models that describe the learning of a structured skill and on simulations of populations of automata that become more complex as they develop. Applicability and limitations on a simple learning model based on terms of continuous, information-like measures are discussed. The model considers the contribution from learning of the i-th skill to learning of the j-th. Limitations arise for the description of learning of higher-order concepts. The relevance of statistical and homeostatic approaches to the description of learning and adaptation is considered; each is viewed as contributing to the characterization of a real-life population of organisms. The simulation model shows that individual automata do not learn on their own but in cooperating groups. The elaborate population that is postulated shows stability over a larger range of cost parameter values in an unconstrained environment than in a constrained environment. A gregarious automation is described that has a sensory system (sensitivity to density of population) and a memory system; significance is associated with properties that remain invariant or exhibit regular and correlated transformation.

Author (TAB)

N66-28290# HRB-Singer, Inc., State College, Pa.
**GUIDEBOOK FOR THE COLLECTION OF HUMAN FAC-
 TORS DATA Final Report**

Louis B. Meyers, Robert G. Carter, and Robert S. Hosteller
 Jan. 1966 122 p refs

(Contract Nonr-4751(00))

(PTB-66-3; AD-631023) CFSTI: HC \$4.00/MF \$0.75

The guidebook was developed primarily as a reference to aid the Project Officer in the assessment of human factors effects on system performance and in the isolation of the causal factors. There are three sections to this guidebook, each serving a different purpose. Section I provides the necessary background information and sets the perspective for the use of the techniques and materials presented in Section II. This section contains the tools and techniques for system evaluation. This includes methods for obtaining time, accuracy, and maintenance data as well as the techniques for analyzing and interpreting these data. Methods for obtaining qualitative data through questionnaires and checklists are also contained in this section, including sample questionnaires and checklists. The third section (Section III) contains a fairly detailed example of the application of the previously described techniques. Also included are rather complete lists of test objectives and criteria measures.

Author (TAB)

N66-28307# Human Engineering Labs., Aberdeen Proving
 Ground, Md.

**A FIELD SURVEY OF AIR-TO-GROUND TARGET-DE-
 TECTION PROBLEMS**

Samuel A. Hicks and Calvin G. Moler Jan. 1966 31 p refs
 (TM-1-66; AD-631361) CFSTI: HC \$2.60/MF \$0.50

Twenty enlisted men were tested on a target-detection test at Ford Ord, California. Each subject was required to detect ten targets appearing at ranges of 1000 meters to 2100 meters. Forty trials were run. The results indicate that detection and identification depend on more than mere distance between target and observer. Not only did a target's size and form affect its detectability, but it appeared

that the main cause of misidentifications was differing targets with similar sizes and forms. These results are related to current literature, and their implications for the course of the program are examined.

Author (TAB)

N66-28314# Air Force Inst. of Tech., Wright-Patterson AFB,
 Ohio. School of Engineering.

**EFFECTIVE TECHNICAL COMMUNICATIONS. MECHAN-
 ICAL DESCRIPTION, EXPERIMENT II**

Richard M. Davis 1965 131 p refs

(AFIT-TR-65-1; AD-631238) CFSTI: HC \$4.00/MF \$1.00

The effects of variables upon the effectiveness of a written technical communication were tested in a 3X2X2X2 factorial experiment. The subject matter was a description of a simple mechanism. The variables were (1) the manner in which the size and shape of the machine and its parts were presented, (2) introduction (present or absent), (3) internal orienting material (present or absent), and (4) headings (present or absent). The effectiveness of the message was measured by (1) comprehension, (2) reading time, (3) the readers' impression of the author's knowledge of the subject matter, and (4) the readers' impression of the author's competence as a writer. The audiences tested were (1) bright young people with known technical interests, (2) bright young people without known technical interests, (3) young men of average intelligence known to have technical interests, and (4) young men of below average intelligence known to have technical interests. The structural aids (introduction, internal orientation, and headings) contributed little to the effectiveness of the message as measured by the criteria used, and they even proved harmful in some instances. The experimental method used shows promise as a fairly reliable predictive instrument.

Author (TAB)

N66-28330# European Atomic Energy Community, Brussels
 (Belgium). Radiobiology.

**ACUTE AND CHRONIC EFFECTS OF RADIATIONS CON-
 sidered primarily from the angle of nucleic
 acid and protein Final Report [EFFETS AIGUS ET
 CHRONIQUES DES RADIATIONS ENVISAGEES SUR-
 TOUT AU POINT DE VUE DU METABOLISME DES ACIDES
 NUCLEIQUES ET DES PROTEINES Rapport Final]**

Apr. 1966 42 p refs In FRENCH and GERMAN; ENGLISH
 summary

(Contract EURATOM-053-64-3 BIOB)

(EUR-2769.f) CFSTI: HC \$2.00/MF \$0.50

Studies are reported on the early cytochemical, biochemical, and genetic effects of ionizing radiations on plants and mammalian tissues, and on their modifications by radioprotectors. The following projects were included: (1) Studies on the effects of radiations on : the ultrastructure of the duodenum, the influence of the age on the radiosensitivity of rats, the incidence of dominant lethals in male germ cells, chromosomal lesions, several biochemical alterations, especially the metabolism of proteins, of thymidine kinase, of nuclear RNA, of acid DNase of the spleen, of DNA synthesis in the perfused liver, of tryptophane, etc. (2) Studies on the mechanisms of action of radioprotectors: the increased effectiveness of mixtures of radioprotectors; the study of the influence of radioprotectors on cell metabolism. (3) Studies on the influence of radiation on the permeability of the cell membrane to DNA and on the translocation of DNA in different organisms (mice and plants), by means of chromatographic studies with DEAE-cellulose paper, ultracentrifugational studies in CsCl gradients and autoradiographic studies.

Author

N66-28341# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

A NEW Tc^{99m} COLLOID IN HEPATIC SCINTILLATION SCANNING [UN NUEVO COLOIDE DE Tc^{99m} EN CEN-TELLOGRAFIA HEPATICA]

Jose Martinez Seeber, Victorio Pecorini, Osvaldo Degrossi, Americo Olivari, and Abraham Chwojnik 1966 12 p refs In SPANISH

(CNEA-168) CFSTI: HC \$1.00/MF \$0.50

This paper describes the experience gained in hepatic scintilligraphy using a new sulfur-antimony colloid labeled with Tc^{99m} . The nuclide emits pure low energy gamma radiation. The colloid is captured by the reticuloendothelial system, concentrating the radioactive nuclide in the liver. These two advantages explain the excellent results obtained in the hepatic scintilligraphy with this compound. Because of its short half-life and radioactive emission characteristics, the dose of body and target organ (liver) radiation is substantially lower when the Tc^{99m} labeled colloid is compared with other labeled compounds also used in hepatic scintilligraphy.

Transl. by R.N.A.

N66-28344# Royal Inst. of Tech., Stockholm (Sweden). Speech Transmission Lab.

SPEECH TRANSMISSION LABORATORY Quarterly Progress Summary and Status Report No. 23, 15 Apr. 1966

15 Apr. 1966 66 p refs

(Contract DA-91-591-EUC-3881; Grants AF-EOAR-66-24; NIH NB-04003-04)

(STL-QPSR-1/1966) CFSTI: HC \$3.00/MF \$0.75

CONTENTS:

1. SPEECH PRODUCTION S. Ohman et al p 1-16 refs
2. SPEECH PERCEPTION J. Martony et al p 17-22 refs
3. INSTRUMENTATION FOR ANALYSIS AND SYNTHESIS J. Liljencrants et al p 23-36 refs

N66-28348# California Univ., Los Angeles.

LABORATORY OF NUCLEAR MEDICINE AND RADIATION BIOLOGY SEMIANNUAL PROGRESS REPORT, PERIOD ENDING 31 DECEMBER 1965

[1965] 106 p refs

(Contract AT(04-1)GEN-12)

(UCLA-12-576) CFSTI: HC \$4.00/MF \$0.75

Summaries of research efforts in the major areas of biochemistry, radiobiology, pharmacology and toxicology, nuclear medicine, biophysics, and environmental radiation are compiled. These include such investigations as the effect of lipids on enzyme level in beating rat heart cells; the effect of chloride ions on some radiation chemical reactions; lung scanning radioaerosol inhalation; arteriolar blockade studies; irradiation of *Neurospora crassa*; gamma spectrometry of neutron activated soils; and effects of beryllium in plants and soil.

C.T.C.

N66-28355# Los Alamos Scientific Lab., N. Mex. BIOLOGICAL AND MEDICAL RESEARCH GROUP (H-4) OF THE HEALTH DIVISION Annual Report, Jul. 1964-Jun. 1965

20 Dec. 1965 267 p refs

(Contract W-7405-ENG-36)

(LA-3432-MS) CFSTI: HC \$6.00/MF \$1.50

A compilation of summaries of research efforts in biological and medical programs involving fundamental and applied investigations is presented. The fundamental studies were directed toward the biological phenomena at the molecular and cellular levels; while the applied investigations were concerned largely with somatic and genetic effects

of radiation on animals. Major topics include mammalian metabolism, mammalian radiobiology, biophysics, cellular radiobiology, and molecular radiobiology.

C.T.C.

N66-28367# National Aeronautics and Space Administration, Washington, D. C.

THE INFLUENCE OF LOW TEMPERATURE ON MICROORGANISMS. PART II. THE INFLUENCE OF LOW TEMPERATURE ON THE DEVELOPMENT OF MOLDS [VLIYANIYE NIZKIKH TEMPERATUR NA MIKROORGANIZMY. II: VLIYANIYE NIZKIKH TEMPERATUR NA RAZVITIYE PLES-NEVYKH GRIBKOV]

F. M. Chistyakov and Z. Z. Bocharova May 1966 33 p refs Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 6, no. 9-10, 1937 p 1293-1309

(NASA-TT-F-10144) CFSTI: HC \$2.00/MF \$0.50 CSCL 06M

The effect of low temperatures on the growth of molds, with emphasis on food storage problems, is discussed. Experiments on 40 different species of molds, some of which were isolated from frozen foods, showed viability and growth at temperatures as low as -8°C . The effect of low temperatures on visible growth and formation of conidia or spores differs for the various species and strains. The delay in the appearance of visible growth lengthens with decreasing temperature, reaching its maximum in the interval before the temperature minimum at which growth stops completely.

Author

N66-28380# Northrop Space Labs., Hawthorne, Calif.

THE DEVELOPMENT OF AN ADVANCED SYSTEM TO COOL A MAN IN A PRESSURE SUIT

R. B. Olson, J. Felder, and C. F. Lombard [1966] 50 p (Contract NAS9-4925)

(NASA-CR-65382; NSL-66-73) CFSTI: HC \$2.00/MF \$0.50 CSCL CSCL06K

A feasibility study was conducted and a configuration developed of a conductive cooling system for cooling a man in space. The results of the bench tests and the single man test demonstrate the feasibility of this concept, plus the need for further development work to produce a model having the desired efficiency, reliability, and safety for space use.

Author

N66-28418# North American Aviation, Inc., Downey, Calif. Space and Information Systems Div.

STUDY OF THE LIMINAL ANGLE OF A PLAGIOGEOTROPIC ORGAN UNDER WEIGHTLESSNESS Final Report

S. P. Johnson 29 Mar. 1964 56 p

(Contract NAS2-1539)

(NASA-CR-75686; SID-64-700; AD-457765) CFSTI: HC \$3.00/MF \$0.50 CSCL 06F

Included is a discussion of the general background and requirements underlying the study effort. Specific procedures and results are summarized and discussed. In addition, the requirements, constraints, design features, and test results of laboratory preprototypes are presented. (Preprototypes were designed and fabricated to serve as a basis for flight hardware.) The general requirements and design considerations for a spaceflight biological package are described. Finally, overall study findings are summarized, with specific problem areas and recommendations for further research.

Author

N66-28425# Chicago Univ., Ill. Dept. of Biophysics.

EXO BIOLOGY STUDY: ANALYTICAL SYSTEMS FOR BIOLOGICAL STUDY OF MARS. THE ROLE OF ELECTRON MICROSCOPY AND ELECTRON OPTICAL TECHNIQUES IN EXO BIOLOGY

Humberto Fernandez-Moran Apr. 1965 28 p refs Revised (Grant NsG-441)

(NASA-CR-75702) CFSTI: HC \$2.00/MF \$0.50 CSCL 06F

Discussed are possible contributions of electron microscopy and related electron optics for experiments on Mars *in situ*, with telemetry back to earth. Application of high spatial resolutions of the order of 6 to 8 Å permit direct visualization of molecular structures and are of particular significance in the study of submicroscopic interstellar particles with diameters of a few tenths of a micron down to 10 to 100 Å. Electron microscopic methods can be readily adapted directly to TV cameras and thus represent a logical extension of vidicon microscopes for planetary exploration. A simple miniaturized electron microscope coupled directly into the same vacuum system with the television survey camera would possess a few hundred Angstrom units resolving power; its electron image could be converted by image intensifiers into electrical signals and sent to earth. Combinations of electron microscopes with X-ray sources can be used for microabsorption X-ray spectrometry; X-ray microdiffraction could detect collagen and other fibrous proteins in larger bulk samples; and different scanning microscopes would be valuable for analyses in the Martian rarefied atmosphere. G.G.

N66-28427* # Chicago Univ., Ill.
INTEGRATED RESEARCH AND TRAINING IN SPACE-MOLECULAR BIOLOGY Annual Progress Report, Apr. 1, 1965-Mar. 31, 1966

Humberto Fernández-Morán [1966] 94 p refs (Grant NsG-441-63)

(NASA-CR-75698) CFSTI: HC \$3.00/MF \$0.75 CSCL 06G

The specimens collected by the Luster sounding rocket experiment during the Leonid meteor shower were examined by combined high resolution microscopy and electron diffraction techniques. The preliminary findings from these examinations are summarized in this report. The equipment, procedures for contamination control, and the conditions under which the studies were performed are discussed. Illustrations are provided which show that a number of characteristic particles have been found in the Luster on-flight specimens which are essentially similar to the three types of micrometeorite particles described by earlier investigators. Additionally, it is stated that application of low intensity electron microbeam illumination and specimen cooling, permitted the unexpected finding of an opaque electron sensitive material which appears to coat many of the particles, and is volatilized or degraded by electron bombardment. H.S.W.

N66-28455* # Public Health Service, Washington, D. C. Biophysics Section.

REDUCTION OF MICROBIAL DISSEMINATION, GERMICIDAL ACTIVITY OF ETHYLENE OXIDE, REDUCTION OF MICROBIAL CONTAMINATION ON SURFACES, EVALUATION OF LEAKAGE OF MICROBIAL CONTAMINATION FROM SPACE SUITS Quarterly Summary Report No. 7 May 1966 15 p

(NASA Order R-137)

(NASA-CR-75733) CFSTI: HC \$1.00/MF \$0.50 CSCL 06M

In continuing studies on planetary quarantine requirements, techniques were developed for measuring possible leakage into the ambient environment of microorganisms shed by humans wearing a prototype Apollo space suit. To estimate shedding, a suited subject was placed (unpressurized) into an environmentally controlled, dynamic, plastic isolator chamber for 30 minutes; various types of bacteriological air samplers were used to collect the viable particles. A modified microbiotank was used to measure the leakage of viable

microorganisms from an occupied pressurized suit into a static environment. After test periods varying from 30 to 60 minutes, the microorganisms were collected and grown on appropriate culture media. A technique was also developed for artificially introducing tracer organisms into the suit. Tabulated data on microbial contamination are given for all tests. Comparative studies showed that a significant reduction of microbial dissemination occurred when a subject was dressed in clean room clothing, rather than in a surgical scrub suit. Preliminary findings are also reported on the continuing study of gaseous ethylene oxide activity against spores of *Bacillus globigii* on institutional dust particles. M.G.J.

N66-28521# Naval Research Lab., Washington, D. C. Chemical Oceanography Branch.

DETERMINATION OF DISSOLVED GASES IN BODY FLUIDS J. W. Swinnerton *In its* Rept. of NRL Progr. Feb. 1966 p 1-5 refs (See N66-28520 16-23) CFSTI: \$1.25

The U.S. Navy's SEALAB II experiment was conducted in August and September of 1965 off La Jolla, California. In this experiment, three teams, of ten men each, lived and worked at 205 feet below the ocean's surface for three separate 15-day periods. This report deals with one phase of NRL's participation in SEALAB, the measurement of dissolved inert gases in the divers' body fluids. Primarily, studies were made of the rate of elimination of helium and nitrogen during the critical decompression stage. The gas chromatography technique used in taking these measurements was developed at NRL. Author

N66-28524* # Public Health Service, Phoenix, Ariz. Technology Branch.

RECOVERY OF VIABLE MICROORGANISMS FROM SOLIDS. I: MODEL SYSTEMS

John R. Puleo, Martin S. Favero, Norman J. Petersen, and Gordon S. Oxborrow 8 Jun. 1966* 28 p refs *Its* Rept.-13 (NASA Order R-137)

(NASA-CR-75693) CFSTI: HC \$2.00/MF \$0.50 CSCL 06M

Test solids were dental inlay material, plaster of Paris, and paraplast. Solid pellets were made by mixing an appropriate amount of these materials with a spore suspension of *Bacillus subtilis* var. *niger*. Pulverization was accomplished by the use of a blender-mill or mortar and pestle. Rates of recovery were low in preliminary tests when the mortar and pestle were used but modifications resulted in a significant increase in the percentage of viable microorganisms recovered. The physical state of the spore inoculum influenced the recovery rates. Significantly higher recoveries were obtained when spore suspensions which were cleaned either chemically with lysozyme or physically by differential centrifugation were used instead of conventional spore suspensions. Similar results were obtained with paraplast. Use of the blender-mill resulted in recovery of fewer viable spores from test solids than use of the mortar and pestle. However, the recoveries were consistent and significant enough to warrant routine use of the blender-mill. Author

N66-28548# Joint Publications Research Service, Washington, D. C.

CERTAIN MECHANISMS OF THE BRAIN PARTICIPATING IN IMPRESSIONING

N. A. Aladzhelova *In its* Studies in Biol. and Machine Memory 24 May 1966 p 10-17 refs (See N66-28546 16-08) CFSTI: \$2.00

Trends in the analysis of certain brain mechanisms participating in sensory stimulation, impressioning and memory

processes are discussed. Figures portray brain cortex neurons, and intergrains between neuron and glial elements. A tentative hypothesis on brain memory is mentioned. Certain portions of the memory model were examined from which the following is formulated: (1) The paths of memory are numerous, united and divided by functional, regulated connections. (2) The memory response element is probable and modified by a number of factors, particularly the supply factor of threshold. (3) The role of the ionic layers emerges on the internal surfaces of the neuron-glia separation; these intergrains acquire guide positions for the circulation of impulses, and contribute to the organization of short-term memory. Long-term memory is proposed for the neuron coded on the molecular level in the numerous memory cells.
R.L.I.

N66-28585* National Aeronautics and Space Administration, Washington, D. C.

RENAL FUNCTION DURING HEAVY MUSCULAR WORK [UEBER DIE NIERENFUNKTION WAEREND SCHWERER MUSKELARBEIT]

F. Grande Covian and P. Brandt Rehberg Jun. 1966 26 p refs Transl. into ENGLISH from Skan. Arch. Physiol. (Scandinavia), v. 75, 1936 p 21-37

(NASA-TT-F-10205) CFSTI: HC \$2.00/MF \$0.50 CSCL 06P

Results on kidney function tests during and after heavy muscular work are discussed on the basis of a modified filtration-resorption theory, covering filtration in the glomeruli, resorption of water and of threshold substances in the tubuli, and back-diffusion of diffusible substances in the tubuli. Creatinine tests and urea clearance showed that a reduction in diuresis occurred during and after muscular work, proportional to the intensity of the work done. The presumable reason is an increased resorption, due to enhanced water loss. The filtration remained constant during light and moderate work, decreased during strenuous work, and returned to normal after stopping the exercise. Proteinuria after exhausting work was attributed to an incipient renal anoxemia.

Author

N66-28662# Aircraft Armaments, Inc., Cockeysville, Md.
A STUDY OF TACTICAL DECISION MAKING BEHAVIOR
Final Report, Nov. 1964-Nov. 1965

Robert G. Kinkade, Jerry S. Kidd, and Maurice P. Ranc Bedford, Mass., AFSC, Electron. Systems Div., Nov. 1965 85 p refs

(Contract AF 19(628)-4792)

(ESD-TR-66-61; AD-478769)

A study program was conducted to investigate tactical decision making behavior. One aspect of the program involved defining a conceptual view of tactical decision making behavior. The other aspect of the program consisted of performing five experiments related to the conceptual view. A conceptual view is not uniquely different from existing views. It represents a combination of concepts which have been described by other people. The view provides a framework for categorizing research findings and investigating the operations of a command post. The experiments concerned investigating the effect of feedback factors, situation factors and task factors on tactical decision making performance. An artificial task, placed in an Air Defense context, was used as a research vehicle in these experiments. The results of the experiments have implications for training tactical decision makers and for designing command-control systems. Author (TAB)

N66-28744# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

ZOOMETRIC MEASUREMENTS AND ORGAN WEIGHTS OF THE BLACK BEAR Final Report

Neville P. Clarke and Stephen J. Doelker (Dayton Univ.) Dec. 1965 14 p refs

(AMRL-TR-65-199; AD-478869) CFSTI: HC \$1.00/MF \$0.50

Zoometric measurements and organ weights of 13 black bears used as experimental animals in the B-58 escape capsule development program are reported. These data are intended for use in future experiments where external dimensions of the test animal are required and for useful information in determining the comparability of the black bear to man in terms of biodynamics characteristics.

Author (TAB)

N66-28746* California Inst. of Tech., Pasadena. Div. of Biology.

NEURAL CONTROL OF HIBERNATION IN MAMMALS; THE RELEVANCE OF PHYSIOLOGICAL CLOCKS AND ENVIRONMENTAL FACTORS Progress Report, 1 Sep. 1965-28 Feb. 1966

[1966] 22 p refs

(Grant NGR-05-002-031)

(NASA-CR-74541) CFSTI: HC \$1.00/MF \$0.50 CSCL 06P

CONTENTS:

1. PARAMETER SELECTION FOR PERIODICITY MEASUREMENT BY THE METHOD OF POWER SPECTRAL ANALYSIS F. R. Schlechte p 3-11 refs (See N66-28747 16-04)

2. PROCESSING AND ANALYZING HIBERNATION DATA RECORDED ON DIGITAL MAGNETIC TAPE J. A. Streeter p 12-17 refs (See N66-28748 16-04)

3. PROLONGED IN VITRO CULTURE AND AUTORADIOGRAPHIC STUDIES OF NEURONS IN APLYSIA Felix Strumwasser and Renate Bahr p 18

N66-28747* California Inst. of Tech., Pasadena.

PARAMETER SELECTION FOR PERIODICITY MEASUREMENT BY THE METHOD OF POWER SPECTRAL ANALYSIS

Floyd R. Schlechte *In its Neural Control of Hibernation in Mammals; the Relevance of Physiol. Clocks and Environ. Factors* [1966] p 3-11 refs (See N66-28746 16-04) CFSTI: HC \$1.00/MF \$0.50

The equations of power spectral analysis were used to estimate periodicities in both computer generated and real data. The real data were brain temperatures recorded from squirrels of a hibernating species. From a study of the calculated results rules of thumb were developed for specifying the data grouping interval, the number of data groups, and the maximum lag in the autocorrelation coefficients for input to the power spectra.

Author

N66-28748* California Inst. of Tech., Pasadena.

PROCESSING AND ANALYZING HIBERNATION DATA RECORDED ON DIGITAL MAGNETIC TAPE

John A. Streeter *In its Neural Control of Hibernation in Mammals; the Relevance of Physiol. Clocks and Environ. Factors* [1966] p 12-17 refs (See N66-28746 16-04) CFSTI: HC \$1.00/MF \$0.50

This report is a follow-up of a data acquisition program previously described which is designed to compress, reformat, and summarize the magnetic tape record of several intermixed time series. A brief description of the program is included. Difficulties which were encountered in processing the data are discussed along with their solutions. Also included is a

description of a program to check, edit, and combine tapes used for data storage, a summary of tape processing expenses, and a description of some of the graphical and statistical techniques used in analyzing hibernation data. R.N.A.

N66-28765* Syracuse Univ., N. Y. Biological Research Labs. **STUDIES ON TRACE ELEMENTS IN THE SPORULATION OF BACTERIA AND THE GERMINATION OF BACTERIAL SPORES** Informal Semi-annual Report, 1 Jan.-31 May 1966 Ralph A. Slepecky [1966] 8 p refs (Grant NsG-693)

(NASA-CR-75764) CFSTI: HC \$1.00/MF \$0.50 CSCL 06M

Previous studies and efforts to understand the relationships between trace elements and the formation of spores and their subsequent dormancy and germination are reviewed, and work continuing in the following areas is reported: trace elements and germination in a highly purified system; comparison of the germination of asynchronously grown with synchronously grown spores; and temperature induced sporulation mutants. Results of the purification procedures, the validity of which was confirmed by atomic absorption spectrophotometry, are being checked further since the findings may simplify studies of ion involvement. Further comparisons of spores formed in both synchronous and asynchronous growth systems led to the conclusion that the effect of age on germinative ability could not be observed clearly using the asynchronous system; conversely, results using the synchronous system appeared to be intrinsically similar, if not parallel. Examination continues on temperature induced sporulation mutants in *Bacillus subtilis* to ascertain whether mutants with increased heat resistance may be induced. R.L.I.

N66-28771* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

ASTRONAUT TRAINING

Neil A. Armstrong *In its Contrib. of MSC Personnel to the Manned Lunar Exploration Symp.* [1964] p 43-48 (See N66-28766 16-30) CFSTI: HC \$3.00/MF \$0.75

An overall picture is presented of the academic, survival, and operational training of astronauts for the Apollo mission. Environmental familiarization programs through the use of centrifuges and other simulator devices is discussed. Training equipment mentioned includes mission simulators, the Apollo part-task trainer, Lunar Excursion Module (LEM) simulators, and the Gemini translation and docking simulator. A brief discussion is included of training experience derived from the Gemini program. M.W.R.

N66-28772* National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

ASTRONAUT TRAINING IN GEOSCIENCES

Ted H. Foss *In its Contrib. of MSC Personnel to the Manned Lunar Exploration Symp.* [1964] p 49-52 (See N66-28766 16-30) CFSTI: HC \$3.00/MF \$0.75

A brief description is presented for a lecture series, laboratory sessions, and field trips for training astronauts to carry out the geological and geophysical experiments required by the Apollo mission. Lecture and laboratory sessions of Training Series I dealt with hand specimen identification of minerals and rocks, with emphasis on igneous rocks and their origin. The four field trips were to the Grand Canyon, Big Bend Marathon region of west Texas, Kitt Peak Observatory and Flagstaff area, and northern New Mexico. M.W.R.

N66-28777* Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.

A REPORT OF THE PHYSIOLOGICAL, PSYCHOLOGICAL, AND BACTERIOLOGICAL ASPECTS OF 20 DAYS IN FULL PRESSURE SUITS, 20 DAYS AT 27,000 FEET ON 100% OXYGEN, AND 34 DAYS OF CONFINEMENT, PART I Kenneth R. Coburn 1 Apr. 1966 94 p refs

(NASA Order T-25750-G)

(NASA-CR-65394; NAEC-ACEL-535, Pt. I) CFSTI: HC \$3.00/MF \$0.75 CSCL 06S

The study was designed to validate the 100% oxygen (258 mm Hg) gaseous environment for 20 days with 7 days each of pre- and post-run evaluations. Studies include: renal and pulmonary function, retinal vascular changes, extensive blood work, nutrition, metabolic and water balance, bacteriological flora alterations, psychological manifestations, and full pressure suit and personal hygiene evaluations. While certain significant psychological alterations were observed, the physiological studies disclosed no significant variations from normal values. The atmosphere was well tolerated; however, 20 days constant full pressure suit wear posed some special problems.

Author

N66-28778* Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.

A REPORT OF THE PHYSIOLOGICAL, PSYCHOLOGICAL, AND BACTERIOLOGICAL ASPECTS OF 20 DAYS IN FULL PRESSURE SUITS, 20 DAYS AT 27,000 FEET ON 100% OXYGEN, AND 34 DAYS OF CONFINEMENT, PART II Kenneth R. Coburn 1 Apr. 1966 130 p refs

(NASA Order T-25750-G)

(NASA-CR-65395; NAEC-ACEL-535, Pt. II) CFSTI: HC \$4.00/MF \$1.00 CSCL 06S

The effects on individual and group performance of six men confined for 34 days in an area of about 100 ft³ per man under variable conditions of oxygen concentration, simulated altitude, and wearing apparel were determined. It was postulated that during any prolonged type of confinement the physical, social, and sensory environments become highly structured. The pattern environment affects the perceptual processes and social interactions, and thus affects higher mental activity. Overall, the experimental data regarding errors made in responses to stimuli reveal only minor fluctuations from day to day with minimal or no decrement in performance over time for either the group or individual; and regardless of the altitude, oxygen concentration, or flight clothing condition. Tables of data for the row and column errors are given. A major finding of the study was the increase in differences between estimates and correct responses of the subjects (defined as level of aspiration) for both individual and group performance. Other experimental details (equipment used e.g.) are also given L.S.

N66-28783* Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.

A REPORT OF THE PHYSIOLOGICAL, PSYCHOLOGICAL, AND BACTERIOLOGICAL ASPECTS OF 20 DAYS IN FULL PRESSURE SUITS, 20 DAYS AT 27,000 FEET ON 100% OXYGEN, AND 34 DAYS OF CONFINEMENT, PART III Final Report, 2 Jun. 1964-Nov. 1965

Kenneth R. Coburn 1 Apr. 1966 48 p refs

(NASA Order T-25750-G)

(NASA-CR-65396; NAEC-ACEL-535, Pt. III) CFSTI: HC \$2.00/MF \$0.50 CSCL 06S

The study was designed to validate the 100% oxygen (258 mmHg) gaseous environment for 20 days with 7 days pre and post run evaluations. Studies include: renal and pulmonary function, retinal vascular changes, rather extensive

blood work, nutrition, metabolic and water balance, bacteriological flora alterations, psychological manifestations, and full pressure suit and personal hygiene evaluations. While certain significant psychological alterations were observed, the physiological studies disclosed no significant variations from normal values. The atmosphere was well tolerated; however, 20 days constant full pressure suit wear posed some special problems.

Author

N66-28784* # Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

EFFECTS OF ORAL ADMINISTRATION OF A FUEL CELL PRODUCT WATER TO MACACA MULATTA Final Report, Jan.-Feb. 1965

Ralph F. Ziegler Mar. 1966 28 p Joint NASA/USAF Study (NASA Order T-31248-G)

(NASA-CR-75787; ARML-TR-65-176) CFSTI: HC \$2.00/MF \$0.50 CSCL 06C

A fuel cell product water, proposed as a supply of drinking water in space vehicles, was administered to *Macaca mulatta* at a rate of 35 ml per kg twice daily as the sole source of fluid intake for a 14-day period. Two of eight animals exhibited body weight and hematologic changes that were directly related to enteric disturbances. These, however, were apparently of a spontaneous nature since one of two control animals was also affected, although somewhat less severely. No apparent subacute oral toxicity of the fuel cell product water was demonstrated in monkeys. This indicates that product water having similar chemical and physical properties should present no serious hazard to humans when consumed as drinking water for short periods of time.

Author

N66-28800* # National Biomedical Research Foundation, Silver Spring, Md.

INVESTIGATION OF THERMODYNAMIC MECHANISMS FOR THE PRODUCTION OF COMPLEX COMPOUNDS ESSENTIAL FOR THE ORIGIN OF LIFE Final Report, 1 Oct. 1965-30 Sep. 1966

Margaret O. Dayhoff, Richard V. Eck, and Ellis R. Lippincott [1966] 127 p refs

(Contract NSR-21-003-002)

(NASA-CR-74559) CFSTI: HC \$4.00/MF \$1.00 CSCL 06C

CONTENTS:

1. THERMODYNAMIC EQUILIBRIA IN PLANETARY ATMOSPHERES E. R. Lippincott (Md. Univ.), C. Sagan (Harvard Univ.), R. V. Eck, and M. O. Dayhoff 34 p refs (See N66-28801 16-30)

2. THERMODYNAMIC EQUILIBRIUM IN THE ORIGIN OF ORGANIC MATTER E. R. Lippincott, Y. T. Pratt (Md. Univ.), R. V. Eck, and M. O. Dayhoff 22 p refs (See N66-28802 16-06)

3. EVOLUTION OF THE STRUCTURE OF FERREDOXIN BASED ON SURVIVING RELICS OF PRIMITIVE AMINO ACID SEQUENCES R. V. Eck and M. O. Dayhoff 16 p refs (See N66-28803 16-04)

4. THERMODYNAMIC AND BIOCHEMICAL STUDIES OF THE ORIGIN OF LIFE Margaret O. Dayhoff, Ellis R. Lippincott, and Richard V. Eck 2 p

5. PREDICTIONS OF THE COMPOSITIONS OF THE ATMOSPHERES OF THE PLANETS Richard V. Eck 1 p refs

6. THERMODYNAMIC EQUILIBRIUM ON THE PREBIOLOGICAL EARTH M. O. Dayhoff and R. V. Eck 1 p

7. PROTEIN SEQUENCES TREATED AS MATHEMATICAL PUZZLES: AN ATLAS OF PROTEIN SEQUENCE AND STRUCTURE Richard V. Eck and Margaret O. Dayhoff 1 p

8. PROGRAM RELATE M. O. Dayhoff and R. V. Eck 16 p (See N66-28804 16-04)

9. PROGRAM ALLELE R. V. Eck and M. O. Dayhoff 6 p (See N66-28805 16-04)

N66-28803* # National Biomedical Research Foundation, Silver Spring, Md.

EVOLUTION OF THE STRUCTURE OF FERREDOXIN BASED ON SURVIVING RELICS OF PRIMITIVE AMINO ACID SEQUENCES

Richard V. Eck and Margaret O. Dayhoff *In its Invest. of Thermodyn. Mech. for the Production of Complex Compds. Essent. for the Origin of Life* [1966] 16 p refs (See N66-28800 16-04) CFSTI: HC \$4.00/MF \$1.00

(Grants NIH GM-12168; NIH GM-08710)

(NBR-660101-20878)

The present-day structure of ferredoxin, with its simple, inorganic active site and its functions basic to photon-energy utilization, suggests the incorporation of its prototype into metabolism very early during biochemical evolution, even before complex proteins and the complete modern genetic code existed. The information in the amino acid sequence of ferredoxin enables us to reconstruct its evolutionary history. It has evolved by doubling a shorter protein, which may have contained only eight of the simplest amino acids. This shorter ancestor in turn developed from a repeating sequence of the amino acids alanine, aspartic acid or proline, serine, and glycine. The living relics of this primordial structure persist today because of a conservative principle in evolutionary biochemistry: Natural selection inhibits with extreme severity any change in a well-adapted system on which several other essential components depend. Many such intricate details of the earliest stages of life must still survive, awaiting detection and elucidation.

Author

N66-28804* # National Biomedical Research Foundation, Silver Spring, Md.

PROGRAM RELATE

Margaret O. Dayhoff and Richard V. Eck *In its Invest. of Thermodyn. Mech. for the Production of Complex Compds. Essent. for the Origin of Life* [1966] 16 p (See N66-28800 16-04) CFSTI: HC \$4.00/MF \$1.00

A computer program is described which compares the sequences of amino acids in two proteins to determine the regions in which they might be identical or related in structure, through either function similarity or evolution from a common ancestor. Each fragment of a given length from one protein was compared with each such fragment from the other. A relatedness score was accumulated for each fragment; successive values were determined by a matrix element between the acids in corresponding fragment positions. A matrix of relatedness was used to estimate the probability of replacement of each amino acid by the other. Since gaps may occur in protein sequences as they evolve, fragments of arbitrary length were matched in such a way that when a gap occurs it will introduce only a slight irregularity. Since the optimum length of test fragments varies, this number was set separately for each run, depending on the anticipated relatedness of the two proteins. A weighting function, tapering off at the ends of the fragment, may also be used in computing the scores.

L.E.W.

N66-28805* # National Biomedical Research Foundation, Silver Spring, Md.

PROGRAM ALLELE

Richard V. Eck and Margaret O. Dayhoff *In its Invest. of Thermodyn. Mech. for the Production of Complex Compds. Essent. for the Origin of Life* [1966] 6 p (See N66-28800 16-04) CFSTI: HC \$4.00/MF \$1.00

From the observation of many alleles, a matrix of relative deviations from random pairing was formulated by the computer program described. This matrix can determine a score

of relatedness of two more distant amino acid sequences, e.g., myoglobin and hemoglobin. Based on the frequency of occurrence of each acid in all alleles and assuming random replacements, an expected frequency of each pair was computed. A matrix of the deviations of the observed values from the expected values was derived. The allele data was smoothed by including corrections to the terms based on correlation of the behavior of each pair of amino acids with each of the others. A grouping of the acids for similarity of function can be made on the basis of the correlations. L.E.W.

N66-28819* Lockheed Missiles and Space Co., Sunnyvale, Calif.

EXPERIMENTAL STUDY OF STERILE ASSEMBLY TECHNIQUES, VOLUME I Final Report
W. Hansen et al 21 Mar. 1965 187 p Prepared for JPL (Contracts NAS7-100; JPL-950993)
(NASA-CR-75789; M-56-65-1, Vol. I) CFSTI: HC \$5.00/MF \$1.25 CSCL 06F

A sterilization technique for aseptic assembly of a spacecraft and its heat-sensitive subsystems is examined as an alternative to total heat sterilization. Efforts focused on the assembly of an electronic circuit, as its manufacture is similar to the operations and processes used in assembling a Mars landing spacecraft. Glove box techniques for the electronic-circuit assembly are described. The individual processes of hand soldering, dip soldering, nut and bolt connecting, staking, epoxy bonding, and potting were tested first for the effects of gas atmosphere and assembly techniques, and then from the standpoint of sterility achievement. Effects of ethylene oxide/Freon 12, sterile air, and sterile nitrogen on circuit components were measured. Tests were conducted to determine causes of contamination, and bacteriology reports were compiled from sterilization assays. S.P.

N66-28820# Chicago Univ., Ill. USAF Radiation Lab.
USAF RADIATION LABORATORY QUARTERLY PROGRESS REPORT

15 Jan. 1966 39 p refs
(Contracts AF 41(609)-1693; AF 41(609)-2977)
(QPR-58; AD-629311) CFSTI: HC \$2.00/MF \$0.50

Contents: Further studies on the effects of various drugs on the adenosine triphosphatase activity of the hematopoietic tissues of rats exposed repeatedly to cobalt-60 gamma radiation; Studies on the effect of X-radiation on the hexobarbital metabolizing system of liver microsomes; Hypobaric oxygen exposure and acute radiation lethality in mice. TAB

N66-28821# Chicago Univ., Ill. USAF Radiation Lab.
FURTHER STUDIES ON THE EFFECTS OF VARIOUS DRUGS ON THE ADENOSINE TRIPHOSPHATASE ACTIVITY OF THE HEMATOPOIETIC TISSUES OF RATS EXPOSED REPEATEDLY TO COBALT-60 GAMMA RADIATION
Robert G. Tardiff and Kenneth P. Du Bois *In its* USAF Radiation Lab. Quart. Progr. Rept. 15 Jan. 1966 p 1-14 refs (See N66-28820 16-04) CFSTI: HC \$2.00/MF \$0.50

Measurements were made of the influence of various drugs on the radiation-induced increase in the adenosine triphosphatase activity of the hematopoietic tissues of rats exposed to daily doses of cobalt-60 gamma radiation given at the rate of 46 to 54 R per day. The rats were also treated daily with yeast extract, liver concentrate, dessicated liver, various liver fractions, or acridine orange at various doses administered either intraperitoneally or orally. Groups of four animals were sacrificed after four days of radiation and drug treatment, and adenosine triphosphatase assays were performed on the spleens. Results indicate: (1) intraperitoneal administration of

the drugs provided more protection against enzyme change than the oral treatment. (2) The greatest protection was obtained with yeast extract and two of the liver fractions. (3) The response of male and female rats to chronic gamma radiation was similar, but male rats were slightly more resistant. (4) Substances which proved effective in reducing hematopoietic injury to rat spleens exposed to gamma radiation were ineffective against X-ray at the same daily dose at a more rapid dose rate. L.E.W.

N66-28822# Chicago Univ., Ill. USAF Radiation Lab.
STUDIES ON THE EFFECT OF X-RADIATION ON THE HEXOBARBITAL METABOLIZING SYSTEM OF LIVER MICROSOMES

Kei-Ming Yam and Kenneth P. Du Bois *In its* USAF Radiation Lab. Quart. Progr. Rept. 15 Jan. 1966 p 15-25 refs (See N66-28820 16-04) CFSTI: HC \$2.00/MF \$0.50

The effect of X-radiation on the resynthesis of the hexobarbital metabolizing enzyme system in the regenerating livers of partially hepatectomized adult male rats was studied. It was found that complete resynthesis of this enzyme system occurs within 22 days after partial hepatectomy; however, in rats subjected to X-radiation this process was reversibly inhibited. The extent of the X-radiation inhibition of the resynthesis process was found to be somewhat dependent on the X-radiation administration time. A greater degree of inhibition was obtained when X-ray was administered at 11 to 13 hours after hepatectomy than at 40 to 45 hours. L.E.W.

N66-28823# Chicago Univ., Ill. USAF Radiation Lab.
HYPOBARIC OXYGEN EXPOSURE AND ACUTE RADIATION LETHALITY IN MICE

J. Doull and V. Plzak *In its* USAF Radiation Lab. Quart. Progr. Rept. 15 Jan. 1966 p 26-32 refs (See N66-28820 16-04) CFSTI: HC \$2.00/MF \$0.50

Eight groups of adult male mice were exposed to acute whole-body X-irradiation in the dose range of 400 to 700 R under environmental conditions of hypobaric oxygen (100% O₂ at 5 psia) and air to determine whether this environmental situation would alter acute radiation lethality in this species. It was found that no significant difference existed in the 30 day LD₅₀ obtained for animals irradiated in the hypobaric oxygen environment and that of animals irradiated in air. The mice irradiated under hypobaric oxygen conditions exhibited, however, a slightly shortened median survival time, especially in the mid-lethal X-ray dosage range. Author

N66-28826# Istituto Nazionale di Ottica, Florence (Italy).
PROBLEMS RELATED TO VISUAL PERFORMANCE OF PILOTS Annual Summary Report, 1 Dec. 1964-30 Nov. 1965
Adriana Fiorentini and Lucia Ronchi 20 Dec. 1965 119 p refs

(Contract AF 61(052)-850)
(AD-630475) CFSTI: HC \$4.00/MF \$0.75

CONTENTS:

1. OCULAR MOVEMENTS AND APPARENT MOVEMENTS DURING ATTEMPTED MONOCULAR FIXATION OF A POINT IN A DARK FIELD A. Fiorentini p 1-33 refs (See N66-28827 16-05)
2. SOME ASPECTS OF THE PERCEPTION OF LIGHT SIGNALS L. Ronchi p 34-68 refs (See N66-28828 16-05)
3. ON THE VARIABILITY OF ELECTRORETINOGRAPHIC RESPONSE L. Ronchi p 69-86 refs (See N66-28829 16-05)
4. VISUAL PERFORMANCE IN THE PRESENCE OF A STEP PATTERN OF ILLUMINATION A. Fiorentini p 87-104 refs (See N66-28830 16-05)

N66-28827# Istituto Nazionale di Ottica, Florence (Italy).
OCULAR MOVEMENTS AND APPARENT MOVEMENTS DURING ATTEMPTED MONOCULAR FIXATION OF A POINT IN A DARK FIELD

Adriana Fiorentini *In its* Probl. Related to Visual Performance of Pilots 20 Dec. 1965 p 1-33 refs (See N66-28826 16-05) CFSTI: HC \$4.00/MF \$0.75

Motor and perceptual aspects of attempted monocular fixation of a bright point in a dark field are investigated. Eye movements during attempted fixation were studied: (a) when a bright point was fixed at the center of the dark visual field, (b) in the dark after extinction of the fixation point, and (c) when the image of a point was stopped with respect to the retina (stabilized point). Autokinetic movements of a bright point with and without stabilization of the retinal image were observed and compared with eye movements. Data reported on perceived direction of a point source as a function of retinal locus showed that the perceptual locus of a small light source is determined with great accuracy by its retinal locus. Test apparatus is described, and the experimental procedures used on the two subjects are detailed. Typical records of the eye movements are presented, the differences in response are assessed, and possible reasons for these variations are discussed. S.P.

N66-28828# Istituto Nazionale di Ottica, Florence (Italy).
SOME ASPECTS OF THE PERCEPTION OF LIGHT SIGNALS

Lucia Ronchi *In its* Probl. Related to Visual Performance of Pilots 20 Dec. 1965 p 34-68 refs (See N66-28826 16-05) CFSTI: HC \$4.00/MF \$0.75

Problems connected with light signal perception are examined, and data are reported on several experiments to determine the effects of various parameters in relation to signal recognition and discrimination. Foveal and extrafoveal vision tests were conducted in the areas of: (a) apparent shape and sharpness sensation under poor viewing conditions, (b) color recognition, (c) influence of eye adaptation on perception of red and blue signals, (d) influence of flickering signals and scattered light, (e) interference signals and field color, and (f) apparent fluctuation of signals of constant intensity and prolonged exposure. In the near periphery, red signals proved more suitable than blue signals. Observer responses indicated that the best signal was located at 520 nm where the sensitivity of the eye is relatively high, the photochromatic interval is small, and the sensitivity to luminance difference is relatively high. S.P.

N66-28829# Istituto Nazionale di Ottica, Florence (Italy).
ON THE VARIABILITY OF ELECTRORETINOGRAPHIC RESPONSE

Lucia Ronchi *In its* Probl. Related to Visual Performance of Pilots 20 Dec. 1965 p 69-86 refs (See N66-28826 16-05) CFSTI: HC \$4.00/MF \$0.75

The reliability of electroretinographic response (ERG), which is change in retinal potential occurring when the adaptational state of the retina is abruptly changed, is discussed on the basis of data recorded from human beings. The ERG reliability is dealt with in relation to changes in response due to inadequate stimulation, conditioning, adaptation, and discriminability. The level of light changes according to the seasonal cycle did not appreciably affect response size. A plot giving rate of increase of response vs. date of session supported the assumption that response could not be ascribed to change in the absolute value of recording resistance, nor to seasonal changes in the level of outdoor illumination. Tests supported the conclusion that scotopic ERG is much less reliable than psychophysical data. S.P.

N66-28830# Istituto Nazionale di Ottica, Florence (Italy).
VISUAL PERFORMANCE IN THE PRESENCE OF A STEP PATTERN OF ILLUMINATION

Adriana Fiorentini *In its* Probl. Related to Visual Performance of Pilots 20 Dec. 1965 p 87-104 refs (See N66-28826 16-05) CFSTI: HC \$4.00/MF \$0.75

Response of the eye to a step pattern of illumination is described in terms of the increment threshold for a small light patch added to the pattern at various distances from the illumination step. An experiment is conducted in which the increment threshold is measured by a narrow bar added to a step pattern at various locations on both sides of the edge. Test apparatus and procedures are outlined. Visual performance data indicate that a weak light signal, which can be clearly perceived when viewed against a uniform dark background and which can still be detected against a brighter background, would become invisible in the proximity of the edge between the dark and the bright area. S.P.

N66-28851# Federal Aviation Agency, Oklahoma City, Okla.
 Office of Aviation Medicine.

PROBLEMS IN DEPTH PERCEPTION: A METHOD OF SIMULATING OBJECTS MOVING IN DEPTH

Walter C. Gogel and Henry W. Mertens Dec. 1965 12 p refs (AM-65-32)

Equations were developed for the simulation on a screen of the movement of an object or surface toward or away from an observer by the movement of a positive photographic transparency of the object or surface away or toward a point source. The general case was developed for simulating objects in which the distance of the observer from the screen was constant but not necessarily equal to the distance of the point source from the screen. Equations were developed relating the dimensions of the rigid transparency to those of the rigid simulated object. These equations, under a wide variety of conditions, permit the simulation of surfaces or objects moving in depth at any designated linear speed or acceleration with respect to the observer.

Author

N66-28853# Library of Congress, Washington, D. C. Aerospace Technology Div.

SOVIET BIOTECHNOLOGY AND BIOASTRONAUTICS, DECEMBER 1964-JUNE 1965 *Surveys of Soviet Scientific and Technical Literature.*

Christopher H. Dodge 11 Feb. 1966 245 p refs Compilation of Abstracts (ATD-66-14)

This compilation of abstracts is based on Soviet-Satellite open sources published 1962-1965. It reflects Soviet research in the fields of space biology, bioastronautics, and biotechnology published for the most part during the last quarter of 1964 and the first two quarters of 1965. Part I. Effects of altered gravity; Part II. Effects of vibration on physiological function; Part III. Biological effects of radiation; Part IV. Effects of hypothermia on mammals; Part V. Effects of altered gas environments; Part VI. Effects of combined stresses; Part VII. Biomedical effects of space flight; Part VIII. Life support systems; Part IX. Human engineering and man-machine factors; Part X. Monitoring, biotelemetry, and data processing; Part XI. Miscellaneous: Future flights, exobiology, ecophysiology. The first page of each part contains a list of the entries by number, title, and page number. Also included in the report are an author index and a subject index. There is no bibliography.

Author

N66-28863# Royal Aircraft Establishment, Farnborough (England).

CONTRAST THRESHOLDS FOR AIR TO GROUND VISION

E. B. Davies Apr. 1965 50 p refs
(RAE-TR-65089) CFSTI: HC \$2.00/MF \$0.50

This paper compares a variety of laboratory detection data on the contrast thresholds of the eye for a variety of target parameters and experimental viewing conditions, such as, target size, background luminance, position of the target image on the retina, type of experimental technique (forced choice or free choice), etc. Data is chosen from this collection for comparison with some limited flight data on detecting ground objects from the air, and it is proposed that contrast thresholds applicable to these practical viewing conditions are obtained from the corresponding laboratory thresholds by increasing the laboratory thresholds by an amount which depends on the degree of difference between the laboratory and the practical viewing conditions. The data applies to zero, or at most small, search situations, and further work is necessary to determine its applicability to widespread search.

Author

N66-28898# Flying Personnel Research Committee, London (England).

THE HUMAN FACTOR IN AIRCRAFT ACCIDENTS—INVESTIGATION OF BACKGROUND FACTORS OF PILOT ERROR ACCIDENTS

A. B. Goorney May 1965 37 p refs
(FPRC/MEMO-224) CFSTI: HC \$2.00/MF \$0.50

An investigation has been made to ascertain if certain factors were implicated in significant percentages of the pilot error accidents occurring during a two year period, with a view to more detailed studies of the causes shown to be most prominent. This study has been concentrated on flying experience and physiological and psychological aspects. Information obtained from the pilots involved in pilot error accidents during the period under investigation has been compared, where possible, with information obtained from controls drawn from pilots flying similar aircraft types who had not been involved in pilot error accidents during the same period.

Author

N66-28895# Joint Publications Research Service, Washington, D. C.

THE PROBLEM OF LIGHT PULSE TREATMENT OF SEEDS AND PLANTS

A. A. Shakhov *In its* Electron. Machining and Treat. of Mater. 12 May 1966 p 82-99 refs (See N66-28888 16-15) CFSTI: \$4.00

Yield in vegetables and other crops can be increased in volume and/or size by irradiating the seeds or plants with pulse concentrated solar light (PCSL) for periods of 20 to 45 minutes. Tubers, seeds, and seedlings were irradiated by PCSL, which provides an intermittent reflected radiant flux, in a series of experiments. Such pulses left an intense formation of photoinduced unpaired electrons; and the number of so-called paramagnetic resonance centers in the seeds and leaves increased with the increase in number of pulses and the moment of saturation. The free radical decreased somewhat through the recombination process. Gain in weight of tomato crops was shown to be between 20 and 30%, and yield of berries increased between 30 and 40%.

M.W.R.

N66-28929# Public Health Service, Las. Vegas, Nev. Southwestern Radiological Health Lab.

POTENTIAL HAZARDS AS A RESULT OF INHALATION OF RADIOIODINES: A LITERATURE SURVEY

Ronald E. Engel 5 Jan. 1966 95 p refs
(SWRHL-13R; TID-22693) CFSTI: HC \$3.00/MF \$0.75

A brief survey was made on the potential hazards to man which might result from releases of radioiodines into the biosphere. The related topic of potential hazards from ingestion

of radioiodine is also considered since the determination of total hazard to man must be the ultimate goal of any research program which has been designed to assess the overall public health significance of any radioiodine releases. Research problems are also suggested. (124 references). NSA

N66-28934# Johns Hopkins Univ., Baltimore, Md.

THE ACTION OF RADIATION AND OTHER MUTAGENIC AGENTS. 1: IN INDUCING MUTATION IN DROSOPHILA FEMALES, AND 2: IN CONTROLLING THE ACTION OF SPECIFIC GENES RESPONSIBLE FOR SUPPRESSING UNCONTROLLED GROWTH Final Report, 1 May 1953-31 Dec. 1965

Bentley H. Glass 28 Feb. 1966 36 p refs
(Contract AT(30-1)-1472)
(NYO-1472-1) CFSTI: HC \$2.00/MF \$0.50

Progress is reported on studies of: the comparative mutagenic effects of ionizing radiations on males and females of *Drosophila melanogaster* at comparable stages of the germ line; the action of suppressor genes in *Drosophila*; and the effect of mating pattern on life span in *Drosophila*. A bibliography of 25 papers published during the contract period is included. NSA

N66-28935# Kernforschungsanlage, Juelich (West Germany).

THE DETECTION OF INCORPORATED PLUTONIUM [UEBER DEN NACHWEIS VON INKORPORIERTEM PLUTONIUM] H. Jacobs Oct. 1965 27 p refs In GERMAN (JUL-312-ST)

A review is given on the present state of plutonium in men on the basis of a bibliographic study. For a better understanding of the methods and for evaluation of the results, some general properties of plutonium and its metabolism in the body are briefly described. The literature of the last 10 years is considered, but no claim to completeness is made. (144 references). Author (NSA)

N66-28943# Laboratoires du Centre d'Etude de l'Energie Nucleaire, Mol (Belgium).

CELLULAR AND BIOCHEMICAL RADIOBIOLOGY [RADIOLOGIE CELLULAIRE ET BIOCHIMIQUE] Final Report

A. Sassen et al Brussels, Belgium. EURATOM, 1965 25 p refs In FRENCH
(Contract EURATOM 014-62-1 BIOB)
(EUR-2201.f)

Using microelectrophoresis in agar, immuno-electrophoresis, and incorporation of amino-acids, the protein changes in the serum and various tissues of mice irradiated with a lethal and sublethal dose of X-rays were studied. The permeability of cellular and tissue membranes to macromolecules and the influence thereon of radiations were studied in both vegetable and animal organs (genital organs and hyperplasia, normal and cancerous tissues, embryo tissues). Data are included from studies of the intracellular distribution of the cytoplasmic hydrolases; the relation between the activity of acid DNase and growth; the inhibition of DNA-polymerase by rat-liver microsomes the thymidine phosphokinases; and the isotopic effect of tritium. NSA

N66-28952# Brussels Univ. (Belgium).

APPLICATIONS OF CELL PHYSIOLOGY TO RADIOBIOLOGY [APPLICATIONS RADIOBIOLOGIQUES DE LA PHYSIOLOGIE CELLULAIRE. RAPPORT ANNUEL, 1964] Annual Report, 1964

1 Mar. 1965 58 p refs In FRENCH
(Contract EURATOM-007-61-10 BIAB)
(EUR-2457.f)

Research during 1963-1964 had to do mainly with the relationships between nucleic acids and proteins. The mechanism of genetic replication was studied in bacteriophages; the suppressor responsible for immunity inhibits the autonomous replication of the prophage and superinfecting phages of the same immunity by direct action, and not merely by preventing the synthesis of a diffusible substance needed for replication. Research into the DNA-RNA transcription mechanism led to the isolation and characterization of reticulocyte messenger-RNA and produced a clearer picture of the way blood-cells are formed in the course of embryo development. The very earliest stages of development (segmentation, gastrulation, neurulation) were also studied with the object of discovering the exact moment at which the various RNAs are synthesized. It was found that oogenesis is accompanied by the formation of numerous ribosomes and of messenger and transfer RNA, together with substantial DNA reserves in the cytoplasm; all these reserves are used during segmentation of the eggs, and new syntheses occur during the start of gastrulation; this explains why the development of irradiated or hybrid embryos is arrested at the point where differentiation begins. It appears that new ribosomes form during differentiation, and study of their proteins in various adult tissues does in fact suggest that these tissues are differentiated in the course of ontogeny. Protein syntheses were investigated both under normal conditions (embryos, acetabularia) and under conditions where the synthesis is inhibited by chemical or physical (X-ray) agents or by natural inhibitors which may exercise an influence in the normal regulation of protein syntheses. Research on the nature and specificity of antibodies was concerned with two aspects. The first was the structure, genetic determination, and methods of biosynthesis of γ globulins; in particular it was demonstrated that anti-TMV antibodies yield a residue which is mainly N-terminal alanine but that this is replaced by aspartic or glutamic acid if the antigen is TMV thr⁺. Secondly, a new gene was revealed which governs the synthesis of 7S γ globulins.

Author (NSA)

N66-28959# California Univ., Berkeley. Lawrence Radiation Lab.

DARK RECOVERY AND GLYCEROL PROTECTION FOR DIPLOID SACCHAROMYCES CEREVISIAE

C. A. Tobias, N. M. Amer, J. K. Ashikawa, J. T. Lyman, L. W. McDonald et al. Aug. 1965 33 p refs Presented at the 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, [1965]

(Contract W-7405-ENG-48)

(UCRL-16377; CONF-650668-1) CFSTI: HC \$2.00/MF \$0.50

Studies with mice, rabbits, and primates indicated that the matter of radiation exposure to astronauts should be of serious concern for space flights of more than a few days' duration. In space flights of several weeks' or months' duration, accumulation of considerable amounts of proton and α -particle doses, particularly to the outer layers of the body, appears unavoidable. A study of unicellular mammalian cell cultures and of microorganisms showed that high-LET irradiation is more effective than low-LET irradiation in producing lethal effect and that there is interaction between the cellular effects of irradiation and other environmental stresses, including temperature, ultraviolet rays, chemical agents, magnetic fields, and vibration. These injuries are irreversible so that accumulating doses produce accumulating injury. At the cellular level, protection from radiation injury was achieved independently of LET with glycerol, and it was also found in yeast cells that postirradiation dark recovery may occur even from the heaviest ions.

NSA

N66-29001# Commissariat a l'Energie Atomique, Grenoble (France).

EFFECT OF FRACTIONATED X-RAY DOSES ON THE HEMOGRAM AND THE PROTEIN FORMULA OF THE MOUSE [ACTION DE DOSES FRACTIONNEES DE RAYONS X SUR L'HENOGRAMME ET LA FORMULE PROTEIQUE DE LA SOURIS]

Denise Alix and Theodore Pierotti Oct. 1965 32 p refs In FRENCH; ENGLISH summary

(CEA-R-2848)

The effects of small radiation doses on mice were studied. Irradiation *in toto* was performed at doses of 50, 100, 150 or 200 R according to groups, either as single or as fractionated doses. It was established that changes begin to become evident only after total exposure of 100R. A decrease of cellular constituents and more often than not an increase of total proteins and gamma-globulins occurred.

Author (NSA)

N66-29002# Virginia Univ., Charlottesville. Radiobiology and Biophysics Lab.

A STUDY OF DNA REPLICATION AND THE IMMEDIATE AND LONG TERM EFFECTS OF RADIATION ON RADIO-SENSITIVE AND RADIORESISTANT MAMMALIAN CELLS Final Report

[1965] 40 p refs CFSTI: HC \$2.00/MF \$0.50

(Contract AT(40-1)-2889)

(TID-22644)

DNA replication was evaluated at four organizational levels: molecular, chromosomal, cellular, and intercellular, under the control and in the environment of the intact animal. Mathematical description of the systems shows the similarity of the systems at the different organizational levels. The data imply that constant monitoring through feed-back mechanisms is in operation to insure an orderly replication at the higher organizational levels. The effects of radiation on DNA replication and cell lethality were studied on a radiosensitive asynchronous population of cells in the intestines, and on a semi-synchronous population of a radio-resistant liver cells under the following conditions: variation of total dose with a constant dose rate; variation in delivery time with a constant total dose; and variation of time between doses with a constant total dose. The depression of DNA synthesis was studied following delivery of total doses ranging from 750 to 24,000 R at a constant dose rate of 300R/minute. The parallel depression of both DNA synthesis and labeled cells suggests that a similar radioinduced mechanism is involved in DNA depression and cell lethality. Preliminary studies on radiosensitive (intestines) and radio-resistant (liver) organs indicate that the effects of radiation on DNA synthesis are similar. DNA depression following fractionated doses of radiation (375R \times 2) and (750R \times 2) showed the same characteristic biphasic response curve as the dose rate and dose response studies. A one-month evaluation of the effects of single and multiple doses of radiation on somatic cells was made. The cells were irradiated near the midpoint of the eight hour replicating period of DNA during the first cycle of hepatocytes synthesizing DNA following partial hepatectomy. The results demonstrate that studies can be made on changes in the total population of cells and in a fraction of the cells synchronized within a specific phase of the cell cycle. Preliminary studies indicated that the effects of radiation on DNA synthesis are similar in both radioresistant and radiosensitive cells. *In vitro* studies were initiated on the relationship between radiation dose and chromosome aberrations in man.

NSA

N66-29030# Jefferson Medical Coll., Philadelphia, Pa.
SPECIALIZED RESPONSES TO IONIZING RADIATION
Second Yearly Progress Report, 1 May 1965-30 Apr. 1966
 Gary S. Shaber [1966] 21 p ref
 (Contract AT(30-1)-3359)
 (TID-22766) CFSTI: HC \$1.00/MF \$0.50

The technique of immunofluorescence was studied and a pilot experiment was carried out in rats to determine the specificity of antifibrinogen serum. The effects of whole-body X-irradiation, with and without epsilon amino caproic acid treatment, on fibrinogen deposition in rats was studied using ^{131}I -fibrinogen and whole-body counting, tissue radioassay, and autoradiography. Preliminary studies were made to determine if tumoricidal doses of radiation could be obtained with ^{131}I -fibrinogen combined with external radiation. Results indicate that the apparent whole-body turnover time of fibrinogen becomes progressively prolonged with increasing doses of whole-body radiation and that fibrinogen leaves the vascular space after whole-body irradiation and that epsilon amino caproic acid enhances the *in vivo* selective deposition of fibrinogen in liver, kidneys, spleen, pancreas, skin, and salivary glands. A taste threshold measuring device was constructed and the taste thresholds for glucose were determined before and after exposure of the tongue to 50 rad irradiation. A preliminary study on hypothalamic self-stimulation rates following head irradiation failed to reveal any significant changes in the taste response of rats exposed to doses of 300 to 1800 R head irradiation. NSA

N66-29087# Battelle-Northwest, Richland, Wash.
COMPARATIVE INVESTIGATIONS ON THE DEFENSE MECHANISM OF CYSTEAMINE AND AET FOR "INTESTINAL RADIATION DEATH"
 Zoltan B. Zseboek and Gyoezoe Petranyi, Jr. 1966 18 p refs
 Transl. into ENGLISH from Strahlentherapie (Munich), v. 127, 1965 p 452-462
 (BNWL-TR-11)

The radiation protective mechanisms of AET and cysteamine for intestinal radiation death were investigated in rats. Sodium absorption in the small intestine and extracellular, exchangeable, or total sodium content, as well as the inulin volume and the serum sodium concentration were used as indicators for changes in the sodium- and liquid metabolism. The results showed that lethal disturbances in sodium- and liquid metabolism can be inhibited indirectly by cysteamine by means of mobilization of sodium-liquid reserves within the organism. AET did not protect significantly, however, in the small intestine; with the loss in sodium and liquid only slight protection was observed. Author (NSA)

N66-29100# Brookhaven National Lab., Upton, N. Y. Medical Research Center.
COMPARATIVE THERAPEUTIC EFFICACY OF HIGH-LET VERSUS LOW-LET RADIATIONS
 V. P. Bond, C. V. Robinson, R. Fairchild, and G. Tisljar-Lentulis [1966] 37 p refs Presented at Conf. on Radiobiology and Radiotherapy, Colorado Springs, Colo., 1-3 Nov. 1965 (Contract AT(30-2)-GEN-16)
 (BNL-10009, CONF-651143-1) CFSTI: HC \$2.00/MF \$0.50

Possible approaches in radiotherapy using high-LET radiations are discussed. Included are neutron capture therapy; accelerator beams; particularly protons and negative Pi mesons; fast neutrons; and the influence of changes in cell survival curves on possible efficacy of high-LET radiations. An effort was made to present objectively the advantages and difficulties of the various approaches. It is possible, in principle, that these approaches may provide effective

modalities for therapy, and in particular, that high-LET radiation may aid in overcoming the problem of relative protection of tumor cells located in hypoxic areas within neoplasms. In all approaches, it is necessary to consider carefully the concomitant changes in shape of dose-cell survival curves that accompany the change from low- to high-LET radiation. It is clear that while all proposed approaches have intriguing features, each requires considerably more work before it can be shown to be a useful adjunct in radiotherapy. Author (NSA)

N66-29102# Texas A&M Univ., College Station. Radiation Biology Lab.
THE EFFECTS OF PRENATAL AND POSTNATAL GAMMA IRRADIATION ON REPRODUCTION IN THE ALBINO RAT
Final Report

George M. Krise 7 Sep. 1965 106 p refs
 (Contract AT(40-1)-2849)
 (TID-22378) CFSTI: HC \$4.00/MF \$0.75

A study was made to determine the effects of chronic low level radiation on the developing testes at specific intervals during pre- and postnatal development in two strains of albino rats. The investigation was divided into four phases to produce the required data necessary to locate stages of extreme sensitivity. Animals receiving 1 and 2 R per day were found to be different histologically from the controls. When 5 R was administered, only the rats irradiated from day 15 prenatal to day 3 of postnatal life showed histological damage to the testes. This damage was not evidenced at 170 days, indicating that regeneration of germinal epithelium had taken place by this time. A total dose of 100 R at the rate of 10 R per day caused damage which was still apparent at 170 days of age. Though animals exposed to this level of irradiation thus showed permanent histological damage, they were not found to be sterile when tested at 143 days of age. Administration of 20 R per day for a total dose of 200 R caused permanent sterility in the Sprague-Dawley rats, but Wistar rats exposed to the same dose were able to produce some litters. A dose of 40 R per day for a total dose of 400 R caused complete destruction of the germinal epithelium in both strains. Wistar rats throughout the study were found to be more radioresistant than Sprague-Dawley rats in almost all cases. The results suggest that the damage to animals in the continuous prenatal and postnatal irradiation study was received during the prenatal and early postnatal period of irradiation. NSA

N66-29122# Brookhaven National Lab., Upton, N. Y. Biology Dept.
WEATHER MODIFICATION: THE EFFECT ON THE BIOLOGICAL EQUILIBRIUM IN THE PLANT COMMUNITY
 R. H. Whittaker [1966] 24 p refs Presented at the Interdisciplinary Symp. in the Phys.-Biol.-Agr. Sci., AAAS Meetings, Berkeley, Calif., 28 Dec. 1966
 (Contract AT(30-2)-GEN-16)
 (BNL-9835, CONF-651211-2) CFSTI: HC \$1.00/MF \$0.50

The effects of change in amount of mean annual precipitation, and increase in mean annual temperature on plant communities are discussed. Agricultural plant communities are excluded. Recommendations are given concerning further ecological studies along these lines. NSA

N66-29125# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
RECOVERY AND RADIO-RESISTANCE IN MICE AFTER EXTERNAL IRRADIATION [RESTAURATION ET RADIO-RESISTANCE CHEZ LA SOURIS APRES IRRADIATION EXTERNE]

Sylvain Le Guillou Oct. 1965 80 p refs In FRENCH
(CEA-R-2776)

A review is presented on recovery from external irradiation and experimental data that suggest the idea of a radioresistance in animals, as well as the hypotheses put forward for explaining this phenomenon. An experiment was carried out on mice whose LD_{50/30} days increased from 1005 to 1380 rads. It was found that an increase occurred in the number of certain anti-bodies circulating after a low dose of γ irradiation. 128 references are cited. Author (NSA)

N66-29131# Battelle-Northwest, Richland, Wash.
LONG-TERM STUDY OF INHALED PLUTONIUM IN DOGS
Technical Report, 1 Sep. 1959-30 Apr. 1965

William J. Bair, James F. Park, and William J. Clarke Kirtland AFB, N. Mex., AF Weapons Lab., Mar. 1966 62 p refs
(Contract AF 29(601)-62-1507)

(AFWL-TR-65-214; AD-631690) CFSTI: HC \$3.00/MF \$0.75

To determine the long-term translocation and biological effects of inhaled plutonium, 40 beagle dogs were given a single 10- to 30-min exposure to Pu²³⁹(02) aerosols. Thirteen dogs died or were sacrificed when clinical signs indicated death was imminent 29 to 66 months postexposure. The body burdens at death ranged from 0.5 to 3 micro Ci with 40 to 75 percent of the body burden in the lungs, and 20 to 50 percent in the bronchial and mediastinal lymph nodes. The liver contained 2 to 21 percent, and the skeleton, 1 to 7 percent. Cardiopulmonary insufficiency and lymphopenia were the primary clinical signs. Pathology in the lungs consisted of severe fibrosis followed by alveolar cell hyperplasia, and bronchiolar and squamous types of metaplasia. Seven of the 13 animals showed bronchiolo-alveolar carcinomas, an incidence of 18 percent as compared to a reported canine primary lung-tumor incidence of 0.2 percent. The bronchial lymph nodes were composed of dense sclerotic connective tissue devoid of any lymphoid element. Metastases of the pulmonary tumor to the bronchial lymph nodes were seen in three animals. Twenty-three dogs with body burden of 0.3 to 1 micro Ci survived 4 to 6 years after exposure. Author (TAB)

N66-29145# California Univ., Berkeley. Operations Research Center.

ON STEADY-STATE INTERCOMPARTMENTAL FLOWS

Simon Levin, George B. Dantzig, and James Bigelow Aug. 1965 18 p refs

(Contract Nonr-222(83); Grant NIH GM-9606)

(ORC-65-26; AD-631370) CFSTI: HC \$1.00/MF \$0.50

The flow between compartments in physical and biological systems is treated as a special case of a more general theory of transitions between any two distinct sets. Interest is focused on the flow rate from each set, i.e., the rate at which elements from that set appear in the other; and on the entry rate from each, i.e., the rate at which elements from the set leave to enter the region not part of either set. In particular, the two flow rates are completely determined by means of explicit expressions for their rates and difference in terms of the two entry rates. An application to biological transport problems extends a result of Dantzig and Pace by demonstrating that for a system of channels each narrow enough to effect a 'lining-up' of particles, counter-gradient flows may result, i.e., flows for which the flow rate is greatest from the compartment with the smallest entry rate. Author (TAB)

N66-29147# Naval Training Device Center, Port Washington, N. Y.

THE EFFECTS OF INDUCED MUSCLE TENSION AND AUDITORY STIMULATION ON TACHISTOSCOPIC PERCEPTION

John L. Andreassi Mar. 1966 65 p refs
(NAVTRADEVEN-IH-49; AD-631840) CFSTI: HC \$3.00/MF \$0.75

The effect of accessory stimulation upon tachistoscopic perception of geometric figures was studied. In experiment I, 32 subjects were tested on two successive days in a complete factorial design (subjects X treatments) in which degree of induced muscle tension (IMT) and level of task difficulty were manipulated. An IMT level of 1/2 of maximum resulted in significantly ($P < .01$) improved visual perception. In experiment II artificial pupils were employed to test the hypothesis that improved performance was due to pupil dilation. Eight subjects from experiment I were tested on five successive days and performance at 1/2 of maximum IMT was again significantly ($P < .05$) improved. Thus precluding pupil dilation as the reason for the results obtained in experiment I. In experiment II performance at the middle level of task difficulty benefited significantly ($P < .05$) from IMT. Experiment III investigated the effects of four levels of auditory stimulation (white noise) on tachistoscopic perception in a new group of 32 subjects. Perception was significantly ($P < .05$) improved with the 1/4 of maximum noise level at the easiest level of difficulty. Results were interpreted within the framework of the activation concept. Recent neurophysiological data point to the ascending reticular activating system as a possible mediator which could influence cortical and retinal areas in the facilitation of tasks such as tachistoscopic perception. Author (TAB)

N66-29167# School of Aerospace Medicine, Brooks AFB, Tex.

PROTECTION OF ENAMEL SURFACES BY COMMERCIAL AND LABORATORY-PREPARED STANNOUS FLUORIDE PROPHYLAXIS PASTES Final Report, Jan.-Nov. 1964

Ira L. Shannon Feb. 1966 16 p refs

(SAM-TR-66-15; AD-631204) CFSTI: HC \$1.00/MF \$0.50

A laboratory investigation was carried out in which both commercially available and laboratory prepared prophylaxis pastes were evaluated as to ability to decrease enamel solubility in lactic acid. Commercially available mixtures from which pastes containing approximately 8% to 10% stannous fluoride were prepared, reduced enamel solubility by about 60% to 80%. Higher concentrations of stannous fluoride provided somewhat more protection, but this increase was not sufficient to offset the disadvantage of increased clinical complications reported for these pastes. The incorporation of stannous fluoride in a prophylaxis mixture is to be recommended. While the subsequent topical application of a stannous fluoride solution is also desirable, it is recognized that the time required for this procedure must be markedly reduced if universal acceptance is to be attained. Author (TAB)

N66-29170# Delaware Univ., Newark.

THE EFFECT OF ASCORBIC ACID SUPPLEMENTATION AND ACCLIMATIZATION TO COLD ON THE ELECTROCARDIOGRAM OF THE GUINEA PIG EXPOSED TO COLD Progress Report

Charles G. Wilber and Frances Zeman (California Univ., Davis) Mar. 1966 91 p refs

(Contract DA-49-193-MD-2627)

(AD-631735) CFSTI: HC \$3.00/MF \$0.75

Guinea pigs were exposed until death in a cold chamber kept at 4°C to 5°C. Some of the guinea pigs were previously acclimatized to 22°C and to 8°C, respectively. Some were given vitamin supplements of 30 or 300 mg per kg ascorbic acid, others were given no vitamin supplement. Electrocardiograms were taken for all animals exposed. Measurements of the various intervals on the electrocardiograms

including the heart rate indicated that the various treatments had no effect on the response of the heart to the cold.

Author (TAB)

N66-29173# Naval Training Device Center, Port Washington, N. Y.

AUGMENTING FEEDBACK AND TRANSFER OF TRAINING
Gene Micheli Mar. 1966 92 p refs
(NAVTRADEVCE-1H-41; AD-631405) CFSTI: HC \$9.60/MF \$0.75

The major finding of the study which was not expected on the basis of previous studies of augmenting feedback was that increasing amounts of information in the augmenting feedback paired with primary feedback conditions that presented little information resulted in positive transfer effects. Specifically, it was found that subjects learned something about the difficult auditory tracking task which persisted following removal of highly informative visual augmenting feedback. This indicates the need to extend the range of task difficulty in augmenting feedback studies to account for tasks presenting very little informative feedback.

Author (TAB)

N66-29178# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aerospace Medical Inst.

CAREFULNESS PEER RATINGS AS A PREDICTOR OF SUCCESS IN NAVAL AVIATION TRAINING Special Report 66-1

Floyd E. Peterson, Norman E. Lane, and Rosalie K. Ambler Feb. 1966 10 p refs

(AD-631752) CFSTI: HC \$1.10/MF \$0.50

Cadets were instructed to indicate whether each of the other members in their class was 'more careful' or 'less careful' than themselves. The Carefulness Ratings (CR) were correlated with scores on each of the primary selection tests and grades in Naval School, Pre-Flight, and the addition of CR to the validity of the Pensacola Student Prediction was investigated. CR had significant relationships to the majority of the primary selection tests and Pre-Flight grades currently employed as predictors. For this reason, despite a significant relationship of CR to the criterion of success/failure, its unique contribution was too small to be of practical value.

Author (TAB)

N66-29206*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

EXPLORATORY STUDY OF MAN'S SELF-LOCOMOTION CAPABILITIES WITH A SPACE SUIT IN LUNAR GRAVITY

Amos A. Spady, Jr. and William D. Krasnow Washington, NASA, Jul. 1966 17 p refs Film Supplement to this report is available on loan from Langley Research Center
(NASA-TN-D-2640) CFSTI: HC \$1.00/MF \$0.50 CSCL 06K

Tests were conducted to compare the effects of a pressurized space suit on man's self-locomotion capabilities at earth gravity and simulated lunar gravity. The suits used were tested at both 0 and 3.5 psi. A reduced gravity simulator was used to simulate lunar gravity. The test subject could walk, run, and perform both vertical and broad jumps under both gravity conditions; however, the tasks were easier and less tiring under lunar gravity. The subjects could jump vertical heights 6 to 7 times higher and perform standing broad jumps about 2 times further at lunar gravity (1/6 g) than at earth gravity (1 g). In general, pressurizing the suit to 3.5 psi reduced the performance by about 30 percent. The test subjects in the pressurized suits were able to perform at lunar gravity many tasks, such as climbing stairs, ladders, poles, and jumping onto a platform 6 feet off the floor, which could not be accomplished at 1 g. The

simulator technique used adapted easily to the pressure suits. The comments of the test subjects and the results of the tests indicate that the reduced gravity simulator is an effective research and training tool, and should be very useful in the development of advanced types of space suits.

Author

N66-29207*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

COMPARATIVE MEASUREMENTS OF MAN'S WALKING AND RUNNING GAITS IN EARTH AND SIMULATED LUNAR GRAVITY

Donald E. Hewes, Amos A. Spady, Jr., and Randall L. Harris Washington, NASA, Jun. 1966 39 p refs Film Supplement to this report is available on loan from Langley Research Center

(NASA-TN-D-3363) CFSTI: HC \$2.00/MF \$0.50 CSCL 06B

A study was conducted to evaluate the effect of lunar gravity on man's walking and running gait characteristics by comparing results of tests conducted in earth and simulated lunar gravity. The lunar tests were conducted by using a modified version of the reduced gravity simulator and the corresponding earth gravity tests were performed by using a portion of asphaltic concrete road of a length equal to that provided by the modified simulator. The test subjects wore lightweight flight coveralls and boots. The subjects walked and ran at various speeds up to their maximums for both gravity conditions. The data were obtained by using a high-speed motion-picture camera stationed 150 feet (46 m) normal to the center line of the track. The results of this study, which are useful primarily as base-line information, indicated that reduced gravity does have a definite effect on the angular movements of the hip, knee, and ankle joints and on the inclination of the body with walking and running. Maximum walking and running rates at simulated lunar gravity were found to be approximately 60 percent of those in earth gravity. A loping gait at about 10 feet per second (3 m/sec) in lunar gravity was, according to the test subjects' comments, the most natural method of self-locomotion.

Author

N66-29226# California Univ., Berkeley. Operations Research Center.

BACTERIAL EXTINCTION TIME AS AN EXTREME VALUE PHENOMENON

Benjamin Epstein Mar. 1966 9 p refs
(Contract DA-31-124-ARO(D)-331; Grants NIH GM-9606; NSF GP-4593)

(ORC-66-8; AD-632205) CFSTI: HC \$1.10/MF \$0.50

The theory of extreme values is shown to be relevant in the analysis of two stochastic biological phenomena.

Author (TAB)

N66-29241# Saskatchewan Univ., Saskatoon. Dept. of Physiology and Pharmacology.

PRECIPITIN RESPONSE TO HUMAN SERUM BY A RABBIT POPULATION. COMPARISON OF STRESSES ON SECONDARY PRECIPITIN RESPONSES

G. Bonar Sutherland and W. G. Glenn (School of Aerospace Med.) Brooks AFB, Texas. School of Aerospace Med., Apr. 1966 11 p refs Prepared in cooperation with School of Aerospace Med.

(Contract AF 41(657)-384)

(SAM-TR-66-27; AD-632250) CFSTI: HC \$1.00/MF \$0.50

The report analyzes the secondary precipitin response of a population of rabbits subjected to various stresses and stress combinations. As administered in this experiment, the following stresses and stress combinations produced a statistically significant depression of precipitin production (compared to controls) during the anamnestic response of

rabbits to a complex antigen (human serum). These are rank-ordered with the stress producing the greatest effect at the head of the list: 6-mercaptopurine; 800 r whole-body gamma radiation immediately followed by 10 days at a simulated altitude of 15,000 ft.; splenectomy followed 21 days later by 800 r of gamma radiation; 800 r whole-body gamma radiation or 15,000-ft. simulated altitude for 10 days followed by 800 r whole-body gamma radiation; and splenectomy. The following stresses showed no significant effect: 15,000-ft. simulated altitude during the induction period; 15,000-ft. simulated altitude for 10 days before the induction period; major surgery involving implantation of dosimeters. Whole-body gamma radiation (800 r) immediately followed by 15,000-ft. simulated altitude resulted in a mortality of 58% within the first 48 hours of decreased atmospheric pressure. Altitude exposure before 800 r gamma radiation did not indicate any synergism or antagonism related to the anamnestic response. Stress did not appear to increase antibody levels in the absence of a booster injection.

Author (TAB)

N66-29261# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

ANTHROPOMETRY OF COMMON WORKING POSITIONS Milton Alexander and Charles E. Clauser Dec. 1965 31 p refs (AMRL-TR-65-73; AD-632241) CFSTI: HC \$2.00/MF \$0.50

Twenty-six dimensions of the human body in various working positions (standing, bending, kneeling, squatting, supine, and sitting) were obtained by photography or by direct measurement. The purpose of the study was to provide the human engineer with anthropometric data of various missile worker's positions so that more adequate work stations can be designed. Each dimension is defined verbally and graphically; and the 5th, 25th, 50th, 75th, and 95th percentiles and other statistical data are presented.

Author (TAB)

N66-29271# School of Aerospace Medicine, Brooks AFB, Tex. **THE EFFECT OF GAS DENSITY ON THE WORK OF BREATHING IN MAN** Final Report, Jan. 1964-Feb. 1965 Domenic A. Maio Mar. 1966 18 p refs

(SAM-TR-66-22; AD-632482) CFSTI: HC \$1.00/MF \$0.50

The effect of gas density on the work of breathing was studied in 3 normal male subjects. Gas density was varied by decreasing the barometric pressure in an altitude chamber, as well as by varying the percentage of oxygen with nitrogen and helium. Three frequencies of breathing were selected at 8, 16, and 24 breaths per minute to cover the resting physiologic range, with tidal volume adjusted to allow an alveolar ventilation of 6 liters per minute. There appeared to be a slight decrease in the total work of breathing at the lower gas densities, owing to a decrease in the nonelastic work of breathing. The elastic work was not influenced by gas density but did decrease with increasing breathing frequency. The nonelastic work likewise was affected by frequency, decreasing at the lower breathing frequencies. The order of magnitude of these changes, however, would probably not be of any practical significance and thus would not be a factor in the preferential selection of a particular gas mixture-cabin pressure combination for a manned space vehicular environment.

Author (TAB)

N66-29273# Zurich Univ. (Switzerland). **ELECTRON MICROSCOPIC AND MORPHOMETRIC STUDY OF RATS EXPOSED TO 98.5 PERCENT OXYGEN AT ATMOSPHERIC PRESSURE** Final Technical Report, Feb. 1964-Jul. 1965

Gonzague S. Kistler, Peter R. B. Caldwell (AMRL), and Ewald R. Weibel Wright-Patterson AFB, Ohio. AMRL, Dec. 1965 47 p refs

(Contract AF 61(052)-784)

(AMRL-TR-65-66; AD-632296) CFSTI: HC \$2.00/MF \$0.50

Rats were exposed to 98.5% oxygen at 765 Torr in a controlled environmental chamber. Groups were sacrificed at 6, 24, 48, and 72 hours and the lungs were prepared for light and electron microscopic examination. A control group breathed room air. In the groups which breathed oxygen for 6 and 24 hours no changes in lung structure could be observed. After 48 hours the interstitial space was enlarged by accumulation of fluid and early destructive changes of the capillary endothelial lining were found. After 72 hours the widened interstitial space contained numerous leucocytes, thrombocytes, and other cells; fibrin strands were numerous. There was marked destruction of the pulmonary capillaries. At this stage, 65% of all alveoli were filled with an exudate containing leucocytes, erythrocytes, macrophages and fibrin strands. There was a decrease in capillary blood volume and of endothelial surface after 72 hours. The thickness of the air-blood barrier was increased after 48 and doubled after 72 hours. The barrier thickening was mainly due to increase of the interstitial space; terminally, the epithelium was also thickened, although the endothelium became thinner, on the average, due to destruction. As a result of these alterations there was a marked fall in estimated gas exchange capacity of the air-blood tissue barrier.

Author (TAB)

N66-29279# Istituto Nazionale di Ottica, Florence (Italy). **DETECTION OF CIRCULAR LIGHT SIGNALS IN RELATION TO SHAPE AND COLOR IDENTIFICATION** Preliminary Progress Report, 1 Dec. 1964-1 Feb. 1965

Lucia Ronchi and Rolando Tittarelli Brooks AFB, Tex., School of Aerospace Med., Feb. 1966 18 p refs

(Contract AF 61(052)-850)

(SAM-TR-66-14; AD-632500) CFSTI: HC \$1.00/MF \$0.50

A small and brief circular spot was flashed at 7° nasal to the fovea. Absolute threshold, color identification threshold, and threshold of perception of the circle were determined. The number of wrong responses given by the subject when attempting to identify the color of the signal and the degeneration of apparent shape under degraded viewing conditions is presented. The radiation emitted by an incandescent lamp, 2800°K, was filtered by filters. The threshold of circular shape identification was found to be slightly higher than that of color identification. The findings were compared with the data reported in the current literature. Practical recommendations for the use of the data are given.

Author (TAB)

N66-29282 FMC Corp., Santa Clara, Calif. Central Engineering Labs.

INFILTRATION OF POROUS FOODS WITH HIGH CALORIC, NON-AQUEOUS, EDIBLE MATERIALS Final Report, 27 May 1964-27 May 1965

R. A. Lampi Natick, Mass., Army Natick Labs., Apr. 1966 119 p refs /ts Tech. Rept.-66-28-FD

(Contract DA-19-129-AMC-84(N))

(FD-45; AD-632311) CFSTI: HC \$4.00/MF \$0.75

Methods together with suitable high caloric formulations were developed for filling the voids of representative baked items and freeze dried meats, fruits and vegetables. Panel tests for acceptability and relevant physical, chemical and microbiological observations are reported for infiltrated products stored for 4 months at a maximum temperature of 38°C. Preparative experience was extrapolated into an engineering flow diagram for large scale production of infiltrated foods.

Author (TAB)

N66-29300* # Washington State Univ., Pullman.
**[STUDY OF INTERMEDIARY METABOLIC PROCESSES
 IN HYDROGENOMONAS FACILIS]** Progress Report, Jan.-
 Jun. 1966

[1966] 9 p ref

(Grant NGR-48-001-004)

(NASA-CR-75863) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

To provide clues about the mechanism of $C^{14}O_2$ incorporation, experimental results are tabulated on the labeling patterns of glutamate and 3-phosphoglycerate (PGA) by $HC^{14}O_3$ during ribose oxidation by *Hydrogenomonas facilis*. In some short-term fixation studies, it was confirmed that TCA-cycle intermediates were not labeled by $C^{14}O_2$. Data support the operation of the Calvin cycle, although at a suppressed rate, during CO_2 fixation by *H. facilis* in the presence of ribose. Separate 10-second fixation studies have confirmed that C^{14} was first incorporated into C_1 and 80% of the label was found; C^{14} was then distributed into C_5 and 20% of the label was found. Data obtained are consistent with the function of α -ketoglutarate synthase, which is known to catalyze a reductive carboxylation of succinyl CoA in photosynthetic bacteria. Failure to find a C^{14} radioisotope in intermediates of the tricarboxylic acid (TCA) cycle was unexpected; it is, however, evident that most enzymes of the TCA cycle are detectable and are probably constitutive in *H. facilis*. Several assays for pyruvate and α -ketoglutarate dehydrogenase have been conducted and results were uniformly negative. R.L.I.

N66-29324* Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

AN ASSESSMENT OF THE FIRE RISKS OF THE OXYGEN ENVIRONMENT EXPERIMENTS

D. M. Denison London, Flying Personnel Res. Comm., Jan. 1965 31 p refs

(FPRC/MEMO-217) CFSTI: HC \$2.00/MF \$0.50

This article discusses the fire risks of experiments to be conducted in a high performance decompression chamber to study the effects of oxygen rich environments on the human respiratory system. The sources of fire risk are detailed and the methods of reducing it are described. There is a small but definite chance that physiological equipment close to the man may be ignited by a local electrical fault which could set fire to the man. There is a more remote risk of fire occurring in the environment conditioning loop or in the vacuum pumps. Either would be confined to the source of origin and could be extinguished by conventional methods. There is no danger of a general conflagration. If a fire occurs within a compartment, whether or not it sets fire to the man, a water sprinkler system will rapidly extinguish it. Subjects should be out of the chamber within one minute of a fire being detected. There still remains a small chance of setting fire to the man even if the procedures outlined are followed. The appendix includes a note on inflammability tests of materials in 100% oxygen. R.N.A.

N66-29357* # National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

LIPID AND GLYCOGEN RESERVES IN HUMANS DURING PROLONGED WORK

R. Pelligra, D. R. Young, R. A. Adachi, G. A. Brooksby, and J. R. Delbro [1964] 21 p refs Submitted for Publication
 (NASA-TM-X-56762) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

Experiments were conducted in which the responses of nonesterified fatty acids (NEFA) and glucose to insulin and epinephrine were used to qualitatively assess the state of body fat and carbohydrate reserves during prolonged exercise. Intravenous insulin (0.05 units/kg) administered to normal fasting humans after 8 hr of aerobic treadmill work

caused a precipitous drop in mean serum glucose and NEFA levels to 41 mg/100 ml and 0.994 meq/l, respectively. Subjects were able to continue walking despite signs and symptoms of severe hypoglycemia and glucose and NEFA returned to preinjection levels within 3 hr. Intramuscular epinephrine (0.10 mg/kg) caused a significant rise in serum glucose, but NEFA values were relatively unaffected as compared to resting controls. Indications are that at the time of injection, (a) liver glycogen stores were significantly lower in the working than in the resting group, but were not depleted to the extent anticipated following a 2500 kcal energy expenditure and 21 hr of fasting, and (b) NEFA were being mobilized from adipose tissue at a maximum rate. Possible mechanisms regulating the availability of energy from fat depots are briefly discussed. Author

N66-29361* # National Aeronautics and Space Administration, Washington, D. C.

COMPARISON OF RADIOSENSITIVITY IN VARIOUS STRAINS OF DROSOPHILA MELANOGASTER [SRV-NITEL'NOYE IZUCHENIYE RADIOCHUVSTVITEL'NOSTI RAZLICHNYKH LINIY DROSOPHILA MELANOGASTER]
 I. Ye. Vorobtsova Apr. 1964 9 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 153, no. 4, 1963 p 943-946

(NASA-TT-F-8840) CFSTI: HC \$1.00/MF \$0.50 CSCL 06C

This report presents the results of a comparative study of radioresistance in seven strains of wild-type *Drosophila melanogaster*. Five to six day old males were exposed to a 100 kr dose using a RUM-7 apparatus. Following exposure, the flies were kept at 25°C, their nutrient medium changed every other day, and dead individuals counted daily until the last fly died. A control was run simultaneously with the experiment. The mean survival time and number of flies that died each day served as indicators of radioresistance. Inter-strain differences in radiosensitivity were found. A high positive correlation was discovered in all the strains between general radiosensitivity and rate at which the flies died during the first post-exposure period. This makes it possible to shorten the length of the observation period needed for objective evaluation of the relative radiosensitivity of the strains. The method of evaluating radiosensitivity from the death rate of individuals during the first post-exposure period may be more accurate than the method involving determination of the mean survival time, because the shorter observation period limits the possibility of distortions due to external factors. R.N.A.

N66-29379* # Stanford Univ., Calif. Biophysics Lab.
MOLECULAR EVOLUTION IN PROTOBIOLOGICAL SYSTEMS Final Report, Dec. 1, 1961-Nov. 30, 1964

M. S. Blois, Jr. and H. H. Pattee Mar. 1965 18 p refs

(Grant NsG-218-62)

(NASA-CR-62532; BL-136) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

The titles of a number of papers concerning experimental and theoretical work in the field of molecular evolution are listed: (1) *Pi-electron Photochemistry of DL-phenylalanine in Oxygen Saturated and Oxygen Free Solutions*, (2) *Random Polymers as a Matrix for Chemical Evolution*, (3) *The Optical and Photochemical Properties of Melanins*, (4) *Photochemistry of DL-phenylalanine*, (5) *Experimental Approaches to the Origin of Life Problem*, and (6) *A Note on Chemical and Hereditary Evolution*. The last two papers are presented here in detail. In addition, a number of Miller type experiments concerning molecular evolution in protobiological systems are cited. These involved arc discharge experiments with various irradiated mixtures of simple organic and inorganic compounds, with IR and UV spectrums of the resulting products for identification purposes. Results are discussed. L.S.

N66-29419* # National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A SURVEY OF LIFE-DETECTION EXPERIMENTS FOR MARS
Aug. 1963 77 p

(NASA-TM-X-54946) CFSTI: HC \$3.00/MF \$0.75 CSCL 06K

Results of a survey of life detection experiments for Mars are presented. The survey was conducted to determine the status and support requirements of a variety of experiments. Emphasis is given to determining which experiments may be available and suitable for the 1966 Mars Mariner mission. Experiments surveyed include the gas chromatograph, Gulliver, the J-band, the mass spectrometer, the multivator, optical rotation, the wolf trap, and several others. Of these, only the gas chromatograph, Gulliver, and multivator have a reasonable chance of meeting schedules imposed by the Mars Mariner mission. The most serious problems uncovered are common to nearly all experiments. No adequate sample collection, concentration, or preparation devices have been devised. Instrument prototype is being delayed by lack of a clear definition of the experiment-vehicle interface. The inability to control the landing site and uncertainties in the knowledge of the Martian atmosphere are factors greatly affecting the success probability of the life detection experiment. The uncertainties are so large that life detection experiments may not be suitable for a Mariner mission and may be more appropriate to a Voyager mission. R.N.A.

N66-29421* # Joint Publications Research Service, Washington, D. C.

STUDIES ON THE SECOND PHASE OF NYSTAGMUS
A. Noto Washington, NASA, Oct. 1963 42 p refs Transl. into ENGLISH from Nippon Jibiinkoka Gakkai Kaiho (Japan), p 40-53

(NASA Order W-11577-B-81)

(NASA-TT-F-8538) CFSTI: HC \$2.00/MF \$0.50 CSCL 06P

Experiments were carried out on the secondary phase of nystagmus using healthy persons and rabbits. The following conclusions were obtained: (1) The secondary phase is a basic pattern of the nystagmus reaction common to rotatory, caloric, and optokinetic nystagmus. (2) The second phase is a function of the basic reflex arc of the nystagmus reaction and is regulated by the higher control pathways involving the cerebrum and cerebellum. Author

N66-29443* # United Aircraft Corp., Windsor Locks, Conn. Space and Life Systems Dept.

STATISTICAL DECISION PROBLEMS IN LARGE SCALE BIOLOGICAL EXPERIMENTS Final Report

D. R. Hitchcock and G. B. Thomas 31 Mar. 1965 148 p (Contract NASw-871)

(NASA-CR-57677; SLS-5305R) CFSTI: HC \$4.00/MF \$1.00 CSCL 06C

This study is concerned with the application of decision theory techniques to the design of biological experiments characterized by high cost, a relatively high degree of uncertainty about the correct functioning of the observational equipment, and a relative lack of antecedent information regarding the probable space-time distributions of the properties or property to be observed. Included are discussions of the decision theory approach to selecting extraterrestrial life detection strategy, reliability and error control, computer simulations of growth and metabolism experiments, bandwidth requirements, problems involving the design and management of spacecraft sterilization procedures, analysis of evaluation problems associated with visual reconnaissance experiments, and statistical measures of life likeness. R.N.A.

N66-29464* # Medical Coll. of Virginia, Richmond. Radiation Physics Div.

INVESTIGATION OF TOTAL ENERGY ABSORPTION IN OMNIDIRECTIONAL GAMMA-RAY, BREMSSTRAHLUNG AND NEUTRON FLUXES Status Report No. 2, 1 Jun. 1965-28 Feb. 1966

Fearghus T. O'Foghludha 28 Mar. 1966 38 p refs

(Grant NGR-47-002-004)

(NASA-CR-75884) CFSTI: HC \$2.00/MF \$0.50 CSCL 06R

Spectral measurements, chemical investigations, and irradiation studies to investigate total energy absorption in omnidirectional gamma rays are reported. Efforts to obtain a response matrix are described in light of a modified 400-channel analyzer and set of calibration spectra. Chemical investigations were restricted to modified ferrous-ferroc systems, another variant using benzoic acid stabilization, and an aqueous benzene system. Phantom mounting and speed programming are mentioned in relation to omnidirectional irradiation. Additional investigations were made on E-detectors, Geiger-Mueller probes, comparison chambers, anthracene detectors, and scatter integrals. S.P.

N66-29472* # National Aeronautics and Space Administration, Washington, D. C.

FORMATION OF PROPROTEIN AND THERMAL THEORY POLYCONDENSATION OF FREE AMINO ACID

Kaoru Harada (Florida State Univ.) Sep. 1963 26 p refs Transl. into ENGLISH from Tampakushitsu Kakusan Koso (Tokyo), v. 6, 1961 p 65-75 Contrib. No. 142 of the Oceanographic Inst., Florida State Univ.

(NASA-TT-F-8429) CFSTI: HC \$2.00/MF \$0.50 CSCL 06A

The formation of proproteins (amino acids) and the thermal theory of the polycondensation of free amino acids are reviewed. Amino acids could have been synthesized from a reducing atmosphere composed of methane, ammonia, hydrogen, and water vapor by such energy sources as lightning, ultraviolet radiation, and radioactivity. Thermal energy does not appear to be an effective energy source for the synthesis of amino acids. It is indicated that the thermal synthesis of copolymers of all of the amino acids found in nature should be possible, in the presence of an excess of glutamic acid and aspartic acid. However, the acidic amino acids are the key "elements" in the thermal polycondensation process. It may be said that ultraviolet radiation and lightning would probably have been more efficient in the formation of amino acids, with thermal energy playing a secondary role. However, based on knowledge of the thermal polycondensation mechanism for polyamino acid synthesis, thermal energy would be the most efficient energy source for protenoid (a primitive protein) synthesis. I.v.L.

N66-29504* # Royal Aircraft Establishment, Farnborough (England).

AIR TO GROUND APPLICATIONS OF VISUAL DETECTION LOBE THEORY

E. Heap London, Min. of Aviation, Jan. 1962 40 p refs Presented at AGARD Avionics Panel Meeting, Jul. 1962

(RAE-TR-ARM-2715) CFSTI: HC \$2.00/MF \$0.50

The theoretical equations for visual detection lobes, depending on the observed contrast of a ground object and its area, are applied to the air to ground role. Taking into account the meteorological range, atmospheric attenuation and the sky/ground brightness ratio, curves are produced which show the sectional area on the ground within which detection is possible. Optimum heights and look angles are determined such that the ground area is maximized for a given maximum slant range to the ground. Details of many varied detection lobes are also tabulated. Author

N66-29539# Royal Air Force, Farnborough (England). Inst. of Aviation Medicine.

THE EFFECT OF THE INVERTED POSTURE UPON THE DISTRIBUTION OF PULMONARY BLOOD FLOW WITHIN THE LUNGS

D. M. Denison, J. Ernsting, D. I. Fryer, and A. B. Pignatelli
London, Flying Personnel Res. Comm., Sep. 1964 21 p refs
(FPRC/1229) CFSTI: HC \$1.00/MF \$0.50

The distribution of alveolar ventilation and of pulmonary blood flow were studied using radioactive xenon in four subjects while seated upright and hanging head down. Inversion reduced the inequality of the distribution of alveolar ventilation between the apical and basal regions of the lung. In the upright position, the ratio of apical to basal blood flow averaged 1:2.5 whereas in the inverted position the mean ratio was 1:0.61. Thus, hanging head down reversed the normal distribution of the pulmonary blood flow, the basal regions receiving considerably less blood than the apical region in this posture. These results demonstrate the marked effect of gravity upon pulmonary circulation.

Author

N66-29570*# Michigan Univ., Ann Arbor. Dept. of Psychology.

BRAIN CENTERS AND POSITIVE REINFORCEMENT
James Olds [1963] 81 p refs Presented at the 27th Intern. Congr. of Psychology, Washington, Aug. 1963 Submitted for Publication

(Grant NsG-626)
(NASA-CR-75896) CFSTI: HC \$3.00/MF \$0.75 CSCL 05J

Research conducted on positive reinforcement produced by electric stimulation of the brain is discussed. The term positive reinforcement is defined, and some results of earlier experiments conducted in this area are given. Research continued to determine the responses when electrodes were placed in various parts of the brain. It was determined that electrical stimulation in a broad set of brain areas yielded effects on behavior tantamount to primary reward. The areas involved were largely in the hypothalamus and the rhinencephalon. With the current correctly adjusted and the electrodes correctly placed, it was possible to generate more motive force with this type of reward than any other reward used in animal experimentation. In addition to areas where stimulation yielded positively rewarding effects, it was determined that there were other areas in the brain where stimulation yielded negatively reinforcing primary-punishing effects. Also, a third set of placements was found where stimulation seemed to yield both effects equally. Additional results are given and the implications of these results are assessed.

H.S.W.

N66-29574*# Naval School of Aviation Medicine, Pensacola, Fla.

THE THOUSAND AVIATOR STUDY: SMOKING HISTORY CORRELATES OF SELECTED PHYSIOLOGICAL, BIOCHEMICAL, AND ANTHROPOMETRIC MEASURES

Norman E. Lane, Albert Oberman, Robert E. Mitchell, and Ashton Graybiel 27 Apr. 1966 20 p refs
(NASA Order R-136)

(NASA-CR-75902; NAMI-961) CFSTI: HC \$1.00/MF \$0.50 CSCL 06P

During the 1963 follow-up examination in the Pensacola Thousand Aviator Study, smoking history information was obtained by questionnaire on 675 subjects. Concurrent data were collected from clinical examinations, laboratory tests, anthropometry, and personal history variables. Two smoking variables were created, Cigarette Amount (CA) and Cigarette Years (CY), each on a scale of 1 to 5 points. From the concurrent data, 62 variables were selected for relevance and general interest

to be examined in relation to smoking. Twenty-four of the 62 variables had significant correlations ($p < .05$) with CA, and 16 showed significant relationships to CY. Findings are related briefly to previous research, and problems of cause-effect isolation are mentioned. It is concluded that results in general support previous findings on smoker-nonsmoker differences. Contributions of the study in delineating areas of research for longitudinal investigation are discussed.

Author

N66-29575*# Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.

[FUNCTIONAL EXTENSION OF THE HUMAN HANDS]
Progress Report, 1 Oct. 1965-31 Mar. 1966

24 Jun. 1966 10 p refs

(Grant NsG-107-61)

(NASA-CR-75911; SA-9991-5) CFSTI: HC \$1.00/MF \$0.50 CSCL 05H

Progress is reported in the development of remote sensors and manipulators. From a simulation study of supervisory control of a manipulator, it was determined that transmission delay does not make remote manipulation impossible. Additionally it was found that intermittent visual feedback, and the lack of rate formation in the display does not necessarily impair control performance; thus a low capacity feedback channel may be sufficient for manipulation tasks. The operation of the Supervisory Controlled Manipulator-1 is briefly discussed. The operator is able to assign a name for a certain positional configuration of the manipulator, and by calling the name assigned, he is able to return to that configuration. The techniques used for detecting and presenting to the operator the sounds generated by the remote hand of a manipulator making contact with its environment are listed, and the conclusions drawn from these investigations are provided. Additionally it is reported that sufficient progress has been made to begin tests of an apparatus to provide an operator of a mechanical remote manipulator with an indication of the pressure applied at a number of discrete points on the remote fingers.

H.S.W.

N66-29576# Bolt, Beranek, and Newman, Inc., Van Nuys, Calif.

THE EFFECTS OF DURATION AND BACKGROUND NOISE LEVEL ON PERCEIVED NOISINESS

Karl S. Pearsons Apr. 1966 65 p refs

(Contract FA-65-WA-1180)

(FAA-ADS-78)

Judgment tests were conducted to investigate the effect of duration and background noise on the perceived noisiness of sounds. The tests were conducted in an anechoic chamber with 18 subjects. Aircraft noise recordings were employed in the background level test, and the results indicate that the presence of background noise reduces the judged noisiness of an aircraft flyover. The duration tests utilized stimuli with two different time patterns and various spectrum shapes over a range of durations from 4 to 64 seconds. Combining the results of these tests with those of a previous study provided duration information over the range from 1-1/2 to 64 seconds. These data suggest that the dependence of perceived noisiness on duration might well be a function with a continuously decreasing slope, varying from -6 to -2 PNdB per doubling of duration over the range of durations tested. For practical purposes, we have approximated the data by straight-line segments for various ranges of duration.

Author

N66-29677# Atomic Energy Commission, Washington, D. C. Div. of Biology and Medicine.

RADIOACTIVE FALLOUT FROM NUCLEAR WEAPONS TESTS. PROCEEDINGS OF THE SECOND CONFERENCE Alfred W. Klement, Jr., ed. Oak Ridge, Tenn., AEC, Nov. 1965 965 p refs Conf. held in Germantown, Md., 3-6 Nov. 1964 *Its* AEC Symp. Ser. No. 5

(CONF-785) CFSTI: HC \$6.50/MF \$3.75

Fifty-seven articles are included on: physical, chemical, and radiological characteristics of atmospheric radioactivity and fallout; long-term particle behavior; local atmospheric transport; global atmospheric transport; and distribution and cycling of radionuclides. NSA

N66-29591# Navy Electronics Lab., San Diego, Calif.

SPEECH INTERFERENCE ASPECTS OF NAVY NOISES Research and Development Report, Jan. 1961-Dec. 1964 J. C. Webster and R. G. Klumpp 2 Sep. 1965 146 p refs (NEL-1314; AD-625262) CFSTI: HC \$4.00/MF \$1.00

Representative samples of ship, office, and shop noises were analyzed to determine simple methods for rating noise in shipboard spaces in relation to interference with speech communication. For simplicity in speech interference measurement, it is recommended that an average be taken of the octaves centered at 500, 1000, and 2000 cycles per second.

Author (TAB)

N66-29592# Wisconsin Alumni Research Foundation, Madison.

SURVEY OF EXISTING METHODS OF FEEDING AND HOUSING THE CHIMPANZEE Final Report, Jun. 1963-May 1965

Paul O. Nees and Philip H. Derse Holloman AFB, N. Mex., Aeromedical Res. Lab., Aug. 1965 38 p refs

(Contract AF 33(657)-11348)

(ARL-TR-65-11; AD-625101) CFSTI: HC \$2.00/MF \$0.50

Background information concerning feeding, housing and handling of the chimpanzee was obtained during visits to major zoological parks and several laboratories maintaining chimpanzees. Information on the habits of the chimpanzee in the wild was obtained and where applicable, this knowledge was used to better understand some of the problems involved in maintaining caged chimpanzees for laboratory purposes. A movable cage with feeder and water was designed to hold chimpanzees from 2 to 6 years old. Methods of handling employing negative and positive reward methods were compared. Diets were compared and revealed zoological parks generally fed a ration of fresh fruits and vegetables with cooked cereals and milk and small quantities of commercial chimp biscuits. Laboratories generally fed the commercial chimp biscuits supplemented with small quantities of fresh fruit and vegetables.

Author (TAB)

N66-29693# Naval Radiological Defense Lab., San Francisco, Calif.

ENDOTOXIN-PROTECTION OF MICE—THE RELATIONSHIP TO COLONY-FORMING UNITS

Gerald E. Hanks (Stanford Univ., Palo Alto, Calif.) and E. John Ainsworth 21 Dec. 1965 44 p refs

(USNRDL-TR-957; AD-630338) CFSTI: HC \$4.80/MF \$0.50

Earlier studies have shown that bacterial endotoxins increase survival of irradiated animals. Although these substances do not confer as much protection as do the classical chemical protectants, endotoxins do significantly increase survival when given either before or for a short time following irradiation. The mechanisms of endotoxin protection have not been clearly established, but earlier

studies have shown that hematopoietic stimulation is involved. The present studies were designed to evaluate the effects of endotoxin on proliferative cells in the hematopoietic system. Methods have recently been devised to measure the numbers of certain proliferative cells within the bone marrow, spleen, and other hematopoietic sites. These proliferative cells are called colony-forming units (CFU's), and their numbers are estimated by counting the 'colonies' or nodules in the spleens of irradiated mice which arise either 'spontaneously' or after injection of hematopoietic cells. The present data indicate that endotoxin does not alter the radiosensitivity of endogenous splenic CFU's; the D37 for CFU's is approx. 90 R in both endotoxin-treated and control mice. When endotoxin is injected at the time which produces optimal survival, the femur content of CFU's increases approx. 2 fold; whereas, the spleen content of CFU's is increased approx. 20 fold. The increased rate of CFU's migration from the femur to the spleen in endotoxin-treated animals may contribute to the relatively greater increase in splenic CFU's.

Author (TAB)

N66-29597# Naval Radiological Defense Lab., San Francisco, Calif.

COMPARISON OF DOSE PATTERNS IN A DOG EXPOSED TO NEUTRONS AND TO X-RAYS

Catharine L. Wingate, Norbert P. Page, and E. John Ainsworth 7 Feb. 1966 28 p refs

(USNRDL-TR-974; AD-630332) CFSTI: HC \$2.00/MF \$0.50

Dose distributions with depth in a dog cadaver and in a cylindrical phantom have been obtained for 1 Mvp transmitted X-rays and for mixed neutron and gamma radiation from a reactor. The ratio of neutron to gamma dose was 4:1 at the surface of the dog. Measurement of the gamma or X-ray dose was made using LiF thermoluminescence dosimeters, while neutron dose was obtained from the activation of small sulfur pellets, with suitable calibrations. Placement of dosimeters was verified by roentgenography. Penetration of the 1 Mvp X-rays is considerably higher than that of the reactor neutrons, whose effective energy is about 1 Mev, and does not appear to differ significantly in various cross sections of the body as was found for 250 Kvp X-rays by others. For the reactor beam administered unilaterally the energy deposition in the dog is strongly asymmetric as shown by isodose configurations for the neutron and gamma components. However, only minor variations were found in the depth dose curves for the phantom and different sections through the dog cadaver, namely, head, chest and abdomen, in spite of the differences in composition and density.

Author (TAB)

N66-29603# Ohio State Univ. Research Foundation, Columbus. Human Performance Center.

FURTHER INVESTIGATION OF THE EFFECTS OF REDUCED INPUT DATA FIDELITY UPON THE DETERMINATION OF POSTERIOR PROBABILITIES IN A SIMULATED THREAT-DIAGNOSIS SYSTEM Final Report, 15 Mar.-1 Aug. 1964

David A. Schum, Irwin L. Goldstein, and Jack F. Southard Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 23 p refs (Contract AF 33(657)-10763)

(AMRL-TR-65-233; AD-631781) CFSTI: HC \$1.00/MF \$0.50

This is the fifth in a series of experiments on Bayesian diagnostic systems. In this experiment two procedures for obtaining a posteriori (P (H/D)) probability estimates were compared under conditions of low fidelity of input data and various levels of time-stress. In one procedure a computer aggregated the subjects' a priori (P (D/H)) estimates. In the alternate procedure the a posteriori probabilities were estimated by the subjects without computer aid. The results

favor the computer-aided procedure and tend to support the use of automated Bayesian hypothesis-selection procedures in diagnostic systems. Author (TAB)

N66-29647*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

FLIGHT CREW PROCEDURES AND TRAINING

Donald K. Slayton, Warren J. North, and C. H. Woodling *In its* Gemini Midprogram Conf. Including Expt. Results 1966 p 201-211 (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

Flight crew preparation activities outlined herein include initial academic training, engineering assignments, and mission training. Pilot procedures are discussed in conjunction with the simulation equipment required for development of crew procedures for the various phases of the Gemini mission. Crew activity summaries for the first five manned flights are presented, with a brief evaluation of the training effort.

Author

N66-29650*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

MAN'S RESPONSE TO LONG-DURATION FLIGHT IN THE GEMINI SPACECRAFT

Charles A. Berry, D. O. Coons, A. D. Catterson, and G. Fred Kelly *In its* Gemini Midprogram Conf. Including Expt. Results 1966 p 235-261 (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

The biomedical data from the Gemini III through VII missions support the conclusion that man is able to function physiologically and psychologically in space and readapt to the earth's 1-g environment without any undue symptomatology. It also appears that man's response can be projected into the future to allow 30-day exposures in larger spacecraft.

Author

N66-29652*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

ASTRONAUTS' REACTIONS TO FLIGHT

Virgil I. Grissom, James A. Mc Divitt, L. Gordon Cooper, Jr., Walter M. Schirra, and Frank Burman *In its* Gemini Midprogram Conf. Including Expt. Results 1966 p 271-276 (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

The Gemini spacecraft was designed to make use of man's ability to function in the space environment. The extravehicular activity carried out during the Gemini IV flight demonstrated that an astronaut could maneuver and work outside his spacecraft. Man's capabilities in space were further demonstrated with the successful rendezvous between Gemini VI-A and VII. Very few anomalies occurred during the first five manned Gemini flights, and most of the planned experiments were performed successfully. The flight crews have been well pleased with the Gemini spacecraft. Even though the cabin is small, the crews have been able to operate effectively and efficiently.

Author

N66-29658*# California Univ., San Diego. Visibility Lab. **EXPERIMENT S-8/D-13, VISUAL ACUITY AND ASTRONAUT VISIBILITY**

Seibert O. Duntley, Roswell W. Austin, John H. Taylor, and James L. Harris *In* NASA. Manned Spacecraft Center Gemini Midprogram Conf. Including Expt. Results 1966 p 329-346 (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

Preflight, inflight, and postflight test of the visual acuity of the members of the Gemini V and Gemini VII crews showed no statistically significant change in their visual capability. Observations of a prepared and monitored pattern of rectangles made at a ground site near Laredo, Tex., confirmed that the visual performance of the astronauts in space was

within the statistical range of their respective preflight thresholds, and that laboratory visual acuity data can be combined with environmental optical data to predict correctly man's limiting visual capability to discriminate small objects on the surface of the earth in daytime.

Author

N66-29663*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EXPERIMENT M-1, CARDIOVASCULAR CONDITIONING

Lawrence F. Dietlein and William V. Judy *In its* Gemini Midprogram Conf. Including Expt. Results 1966 p 381-391 refs (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

Data are presented on ground baseline studies in support of the cardiovascular conditioning experiments which indicated that leg cuffs alone, when inflated to 70 to 75 millimeters of mercury for two out of every six minutes, provided protection against cardiovascular deconditioning occasioned by six hours of water immersion. In the M-1 experiments, flown on the Gemini V and VII missions, the pilots served as experimental subjects; the command pilots as controls. The equipment consisted of a pneumatic timing or cycling system, and a pair of venous pressure cuffs attached to the pilots' thighs. Prior to the missions, each crew member was given a series of tilt-table tests; similar postflight tests were also conducted. Results are summarized for pulse rate changes, blood pressure readings, and changes in leg blood volume, intravascular volume, and nude body weights. Based on the preflight and postflight data, it was concluded that the pulsatile cuffs were not effective in lessening postflight orthostatic intolerance. However, the cuffs appeared to be effective in lessening the degree of postflight pooling of blood in the lower extremities as judged by the strain gauge technique.

M.G.J.

N66-29664*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EXPERIMENT M-3, INFLIGHT EXERCISE—WORK TOLERANCE

Lawrence F. Dietlein and Rita M. Rapp *In its* Gemini Midprogram Conf. Including Expt. Results 1966 p 393-396 refs (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

A day-to-day evaluation was conducted to determine the general physical condition of the Gemini VII flight crew with increasing time under space flight conditions. The study was based on the response of the cardiovascular system (pulse rate) to a calibrated workload. The exercise device consisted of a pair of rubber bungee cords attached to a nylon handle at one end and to a nylon foot strap at the other; 70 pounds of force was required to stretch the cords maximally to a length of 12 inches. Exercise periods of 30 seconds were scheduled twice daily. Additional isometric-isotonic exercises were performed approximately three times daily. Blood pressure measurements were taken before and after each exercise period. Results indicate that the cardiovascular system response to a calibrated workload is relatively constant for a given individual during the 14-day space flight, and that crew members are able to perform mild-to-moderate amounts of work. No decrement in the physical condition of the crew was noted.

M.G.J.

N66-29665*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EXPERIMENT M-4, INFLIGHT PHONOCARDIOGRAM—MEASUREMENTS OF THE DURATION OF THE CARDIAC CYCLE AND ITS PHASES DURING THE ORBITAL FLIGHT OF GEMINI V

Lawrence F. Dietlein and Carlos Vallbona (Baylor Univ.) *In its Gemini Midprogram Conf. including Expt. Results 1966 p 397-402 refs* (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

Simultaneous electrocardiographic and phonocardiographic records were obtained from both Gemini V crewmembers. Analysis of these data revealed: (1) wide fluctuations of the duration of the cardiac cycle within physiological limits throughout the mission; (2) fluctuations in the duration of electromechanical systole that correlated with changes in heart rate; (3) stable values for electromechanical delay (onset of QRS to onset of first heart sound) throughout the mission, with shorter values observed at the peak heart rates recorded during lift-off and reentry; (4) higher values for the duration of systole and for electromechanical delay in the command pilot than in the pilot, suggesting preponderance of cholinergic influences (vagal tone) in the command pilot; and (5) evidence of adrenergic reaction (sympathetic tone) at lift-off, at reentry, and in the few hours that preceded reentry. Author

N66-29666* # National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EXPERIMENT M-5, BIOASSAYS OF BODY FLUIDS

Lawrence F. Dietlein and E. Harris *In its Gemini Midprogram Conf. including Expt. Results 1966 p 403-406 refs* (see N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

Experiments were conducted to determine the effect of space flight on several systems of the human body, and particularly those areas where effects can be observed by alterations in the chemistries of body fluids. Plasma and urine samples were analyzed before flight to obtain baseline data; during flight a urine-sampling and volume-measuring system was used to obtain the total voided volumes. Postflight plasma samples were obtained immediately upon recovery. Analytic procedures are listed, and plasma and urine analyses of the Gemini VII crew are given. Preflight and postflight data indicate that the electrolyte and water retention observed immediately after recovery are consistent with the assumption that the Gauer-Henry atrial reflex is responsive to a change from the weightless to the 1 g environment. Alterations in electrolyte and water distribution during flight may also be contributory. Immediately postflight, plasma 17-hydroxycorticosteroid levels were elevated. Plasma uric acid was reduced, and the cause was presumed to be dietary. M.G.J.

N66-29667* # National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EXPERIMENT M-6, BONE DEMINERALIZATION

Pauline Berry Mack, George P. Vose, Fred B. Vogt (Texas Womens Univ.), and Paul A. La Chance *In its Gemini Midprogram Conf. including Expt. Results 1966 p 407-415 refs* (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

A series of investigations on bone demineralization were conducted to determine the effect upon the human skeletal system of prolonged weightlessness and immobilization associated with confinement for a period of days in the Gemini spacecraft. To evaluate any changes, radiographic bone densitometry measurements were taken. It was found that the crews of Gemini VII experienced lower losses in the os calcis than were found in the crews of Gemini IV and V. In assessing these results, it is stated that the crew members of Gemini VII ate a higher proportion of their diet than the crews of Gemini IV and V. Additionally, the crew had isometric and isotonic exercises, and they slept for longer periods of time. The data obtained from preflight tests are compared to the post-flight results, and recommendations for further study are made. H.S.W.

N66-29668* # National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

EXPERIMENT M-7, CALCIUM AND NITROGEN BALANCE
G. D. Whedon (Nat. Inst. of Health), Leo Lutwak (Cornell Univ.), William F. Neuman (Rochester Univ.), and Paul A. La Chance *In its Gemini Midprogram Conf. including Expt. Results 1966 p 417-421* (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

Procedural details are given on a metabolic-balance study undertaken to observe the biochemical changes occurring as a result of several complex, interrelated influences—principally weightlessness, confinement, moderate physical movement, slight hyperoxia, and low atmospheric pressure. The experiment involved precise control of the dietary intake and the collection and analysis of all excreta in order to obtain a quantitative determination of the extent of change in the principal inorganic constituents of these systems. It also required complete and continuous data on the dietary intake of the Gemini VII crew, and continuous collection of all urine and stool specimens before, during, and after the flight. Perspiration was also collected during representative periods before and after flight, and continuously during flight, to determine excretion of various elements such as calcium. Sample menus are included, and details are given on methods devised for specimen collection. M.G.J.

N66-29669* # Baylor Univ., Houston, Tex. Medical Center.

EXPERIMENT M-8, INFLIGHT SLEEP ANALYSIS

Peter Kelloway *In NASA. Manned Spacecraft Center Gemini Midprogram Conf. including Expt. Results 1966 p 423-429* (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

The feasibility of analyzing sleep by EEG was demonstrated during this experiment. The periods of sleep of the command pilot of Gemini VII were recorded using a helmet-on electrode system arrangement. By comparing the EEG recordings made at a ground based laboratory prior to the flight with the recordings made while in space, it was possible to distinguish between the four levels of sleep; ranging from drifting or drowsiness to the rapid eye movement stage of sleep. Data in the form of sample EEG recordings are included, and a discussion which explains and assesses the importance of these data is included. H.S.W.

N66-29670* # Naval School of Aviation Medicine, Pensacola, Fla.

EXPERIMENT M-9, HUMAN OTOLITH FUNCTION

Earl Miller *In NASA. Manned Spacecraft Center Gemini Midprogram Conf. including Expt. Results 1966 p 431-436 refs* (See N66-29626 16-31) GPO: HC \$2.75; CFSTI: MF \$2.00

The completion of the otolith function experiment carried out in conjunction with the Gemini V and VII flights provided quantitative information concerning otolithic sensitivity and orientation of subjects exposed to an orbiting spacecraft environment for prolonged periods of time. Three separate preflight measurements of ocular counterrolling were made and the results were compared to postflight measurements. There existed a marked difference between the two crews with regard to their basic response; however each pilot maintained his respective preflight level of response. These data indicated that a coordinate space sense exists in weightlessness, however, it was also determined that the apparent location of the horizontal within the spacecraft may not necessarily agree with its physical correlate in the spacecraft. The data obtained from these tests are shown in graphs, and a discussion of these data is included. H.S.W.

N66-29677# Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

ADAPTATION TO EXTREME ENVIRONMENTS: THE ANT-ARCTIC VOLUNTEER

E. K. Eric Gunderson Mar. 1966 32 p refs
(Rept.-66-4; AD-632571) CFSTI: HC \$2.00/MF \$0.50

The report described the Antarctic research program, the Antarctic environment, characteristics of small stations, and the composition of wintering over parties. Demographic and biographic characteristics of Antarctic volunteers, Navy and civilian, were analyzed, and prelistment histories and military performance records of Navy Antarctic volunteers were compared with those of Navy men generally. The selection process was portrayed for Navy occupations represented at small stations, and ratios of applicants to assignments for three expeditions were presented. A detailed analysis was conducted of cultural and psychological differences among antarctic occupational groups. The data were intended to present a rather complete picture of the Antarctic setting and the characteristics of Antarctic volunteers.

Author (TAB)

N66-29686# Naval Radiological Defense Lab., San Francisco, Calif.

⁵⁹Fe INCORPORATION INTO SPLEEN AND BONE MARROW OF INTACT AND SPLENECTOMISED X-IRRADIATED MICE RESTORED WITH SPLEEN COLONY CELLS

Raymond Schofield and Leonard J. Cole 11 Mar. 1966 15 p refs

(USNRDL-TR-989; AD-632049) CFSTI: HC \$1.00/MF \$0.50

Cells from haemopoietic tissues when injected into lethally-irradiated mice induce survival and restoration of the animals, whether they are intact or splenectomised. But cells derived from haemopoietic nodules (which occur in spleens of heavily irradiated mice injected with bone marrow cells) when injected into lethally irradiated mice result in different effects in intact mice than in splenectomised ones. In the former the anaemia resulting from irradiation is corrected within 25 days, whereas in splenectomised mice the anaemia which develops is much more severe and persists for up to 80 days after irradiation. The course of cellular repopulation of bone marrow in splenectomised mice irradiated with 900 rad and injected with spleen-nodule cells has been compared with that in intact mice treated in the same way. No differences were seen, indicating that the absence of the spleen did not have an effect on the repopulation. In order to assess the erythropoietic activity of total body bone marrow, to enable this to be compared with the erythropoietic activity of spleen, determination of ⁵⁹Fe in whole cleaned mouse skeletons was carried out. The results show that in the mouse the two femora account for 13-15% of the total skeletal content of ⁵⁹Fe at 5 hours after injection of the label.

Author (TAB)

N66-29697# California Univ., Los Angeles. Western Management Science Inst.

DECISION-MAKING

Jacob Marschak Dec. 1965 41 p refs /ts Working Paper No. 93

(Contract Nonr-233(75))

(AD-632524) CFSTI: HC \$2.00/MF \$0.50

Descriptive decision theory is an extension of psychology or anthropology; prescriptive decision theory can be regarded as an extension of logic. Propositions of prescriptive theory can also be regarded as possible hypotheses of descriptive theory. Accordingly, an account of experiments that test such hypotheses is used to acquaint the reader with both the currently available empirical evidence and the main elements

of current prescriptive literature. In addition, some alternative descriptive hypotheses are introduced, especially those of probabilistic nature; and the prescriptive materials are extended to include a brief discussion of sequential, informational, and exploratory strategies, and of the cost of decision.

Author (TAB)

N66-29701# Naval Radiological Defense Lab., San Francisco, Calif.

DIFFERENTIAL SENSITIVITY OF CIRCULATING AND PERITONEAL MONONUCLEAR CELLS OF MICE TO TOTAL-BODY X-IRRADIATION

Lottie Kornfeld and Vivian Greenman 21 Mar. 1966 18 p refs
(USNRDL-TR-999; AD-632282) CFSTI: HC \$1.00/MF \$0.50

Dose-response curves obtained 1 and 3 days after exposure to total-body X-irradiation indicate that the mononuclear cells in the circulating blood and in the peritoneal cavity of LAF₁ mice may be arranged in the following order of decreasing sensitivity: circulating lymphocytes, small peritoneal lymphocytes, medium peritoneal lymphocytes, peritoneal macrophages. However, on the 3rd day postirradiation, the curve of the small peritoneal lymphocytes closely approached that of the circulating lymphocytes. It is suggested that the greater sensitivity to irradiation of small than of medium peritoneal lymphocytes is not due to environmental factors but to as yet unidentified differences in the cells. On the other hand, the greater loss of circulating lymphocytes than of small peritoneal lymphocytes 1 day after X-ray exposure may merely reflect more efficient removal of damaged cells from the circulation than from the peritoneal cavity.

Author (TAB)

N66-29706*# Martin Co., Baltimore, Md. Research Inst. for Advanced Studies.

PHOTOINHIBITION OF CHLOROPLAST REACTIONS. I: KINETICS AND ACTION SPECTRA

L. W. Jones and B. Kok [1966] 34 p refs Submitted for Publication

(Contracts NASw-747; AF 41(609)-2369)

(NASA-CR-75984) CFSTI: HC \$2.00/MF \$0.50 CSCL 06A

A study was made of photoinhibition of chloroplast reaction. Besides other features of the process, we analyzed its kinetics and spectral characteristics over a range between 200 and 700 mμ. (2) Irrespective of wavelength, the decline of activity due to preillumination was found to be dependent upon the number of quanta applied, not upon the rate of application. (3) The effectiveness spectra of photoinhibition indicate that active ultraviolet light is absorbed by pigment which is not a normal light absorber for photosynthesis and acts with a high quantum efficiency (<10). (4) Active visible light is absorbed by the pigments which sensitize photosynthesis (chlorophyll, carotenoids) and acts with a very low quantum efficiency (about 10%). (5) The action spectrum of the photoinhibition of dye reduction by chloroplasts and lyophilized Anacystis cells indicated that the damage caused by visible light is due to quanta absorbed by photosystem II. However, dye reduction may reflect only damage to photosystem II.

Author

N66-29723*# National Aeronautics and Space Administration, Washington, D. C.

PERCEPTION OF CERTAIN MECHANICAL QUANTITIES INHERENT TO THE ANIMAL ORGANISM [VOSPRIYATIYE NEKOTORYKH MEKHANICHESKIKH VELICHIN, SVOYSTVENNOYE ORGANIZMU ZHIVOTNOGO]

O. G. Gazenko and N. A. Chekhonadskiy May 1966 17 p refs
Transl. into ENGLISH from Avtometriya (USSR), no. 2, 1965
p 11-17

(NASA-TT-F-10138) CFSTI: HC \$1.00/MF \$0.50 CSCL 06P

The properties of an elementary model of the otolithic portion of the vestibular apparatus, explaining a number of functions of this important organ, are examined. The principles of measuring a number of mechanical parameters necessary for control and coordination of movements are hypothesized on the basis of analyzing the experimental materials and properties of the model, in analogy with data-processing systems for conversion of analog to digital data. Orientation in space, upon deflection of the head from the vertical, and under acceleration, is discussed on the basis of function of the receptor-neuron circuits of the otolithic apparatus. Author

N66-29724*# National Aeronautics and Space Administration, Washington, D. C.

INFLUENCE OF LOW TEMPERATURES ON THE DEVELOPMENT OF MICROORGANISMS. III: INFLUENCE OF LOW TEMPERATURES ON THE DEVELOPMENT OF BACTERIA AND YEASTS [VLIYANIYE NIZKIKH TEMPERATUR NA RAZVITIYE MIKROORGANIZMOV. III: VLIYANIYE NIZKIKH TEMPERATUR NA RAZVITIYE BAKTERIY I DROZHDZHEY]

F. M. Chistyakov and G. L. Noskova May 1966 23 p refs
Transl. into ENGLISH from Mikrobiologiya (Moscow), v. 7, no. 5, 1938 p 565-578

(NASA-TT-F-10142) CFSTI: HC \$1.00/MF \$0.50 CSCL 06M

The Pseudomonas, Flavobacterium and Achromobacter group of bacteria and some micrococci are capable of developing at low temperature: Bact. putidum and Achromobacter sp. develop at -2° ; Bact. fluorescens, Flavobacterium flavescent, Flavobacterium ochraceum, Flavobacterium sp., and Micrococcus sp. increase at -5° , and Flavobacterium sulfureum and Bact. lactis viscosum can multiply even at -8° . The other groups of bacteria, including those of the paratyphoid group and B. botulinus, do not develop at a temperature above $+2^{\circ}$. Thus the minimum temperature required for bacterial development is determined by the group to which the particular bacteria belong. The lowest temperature at which yeast can develop is about -8° . The microorganisms not resistant to cold, gradually die off at low temperature, in some cases rather slowly. The spore-forming types of bacteria are more resistant to cold. The addition of salt to the nutritive media lowers the bacteria's resistance to cold.

Author

N66-29750*# Naval School of Aviation Medicine, Pensacola, Fla.

BIOCHEMICAL CHANGES OCCURRING WITH ADAPTATION TO ACCELERATIVE FORCES DURING ROTATION

James K. Colehour and Ashton Graybiel Apr. 1966 18 p refs
(NASA Order R-93)

(NASA-CR-76042; NAMI-959) CFSTI: HC \$1.00/MF \$0.50 CSCL 06F

Four young men lived in a continually rotating room, 15 feet in diameter, for a period of six days. Rotational velocities on succeeding days were: 6.4, 6.4, 8.6, 10.0, 6.4, and 3.2 RPM. Stress effects measured as increased excretion rates of 17.21 dihydroxypregnane-20-ones, eosinopenia, hyperventilation, and nausea were observed on the first day of rotation. However, adaptation was rapid, and no further stress effects were observed even with increased rotational velocity. Mild degrees of hypercalciuria, hypercapnia, and decreased norepinephrine excretion rates were observed during the last four days of the experiment as a result of the increased time spent in recumbency.

Author

N66-29752*# Naval School of Aviation Medicine, Pensacola, Fla.

A NOTE ON THE DOSIMETRIC INTERPRETATION OF RIGIDITY SPECTRA FOR SOLAR PARTICLE BEAMS

Hermann J. Schaefer 26 Apr. 1966 20 p refs
(NASA Order R-75)

(NASA-CR-76044; NAMI-960) CFSTI: HC \$1.00/MF \$0.50 CSCL 06R

Three flux/rigidity spectra were established theoretically covering the full variability range of all flare events of the past solar cycle and are evaluated dosimetrically. It was found that, of the components heavier than protons, only alpha particles contribute substantially to total exposure. The fractional alpha dose in the tissue surface behind 0.1 g/cm² shielding grows from 40 percent for $P_0=50$ Mv to 400 percent for $P_0=300$ Mv. The alpha dose shows a much steeper drop with increasing depth than the proton dose and would require microensors for accurate measurement. For the alpha and medium heavy components, the RBE shows a pronounced transition in near surface regions which further steepens the drop of RBE dose equivalents as compared to rad doses. The extremely strong and nonlinear dependence of the rad and rem dose distribution on rigidity sharply limits the usefulness of the rigidity concept for dosimetric evaluations and indicates the need for direct measurements of local rad and rem doses on the astronaut's body.

Author (TAB)

N66-29754*# Naval School of Aviation Medicine, Pensacola, Fla.

A STANDARD TECHNIQUE FOR TEMPORAL BONE PREPARATION

Makoto Igarashi 2 Mar. 1966 53 p refs /ts Monograph 13
(NASA Order R-93)

(NASA-CR-76046) CFSTI: HC \$3.00/MF \$0.50 CSCL 06E

This monograph is intended as a guide in the preparation of good temporal bone slides which will make it possible to investigate the correlation between end organ functions and morphological findings. The techniques described herein have been found to render the most consistently satisfactory temporal bone preparations.

Author

N66-29787# Human Engineering Labs., Aberdeen Proving Ground, Md.

MIDDLE-EAR MUSCLE EFFECTS ON LOW-INTENSITY SOUNDS

G. Richard Price Nov. 1965 22 p refs

(TM-16-65; AD-631360) CFSTI: HC \$1.60/MF \$0.50

Experiments in which loudness judgments were made for a tone in one ear while another tone was present in the opposite ear have questioned the role played by the middle-ear muscles. Loudness judgments probably involve both central and peripheral factors. In order to evaluate the peripheral factors, cochlear potentials were measured on 12 lightly anesthetized cats. There were changes in the cochlear potential to pure tones in one ear (ranging in frequency from 0.2 to 10 kilocycles) from middle-ear muscle activity elicited by contralateral two-second pure-tone bursts (ranging from 0.65 to 5 kilocycles) as the tones producing the cochlear potentials were varied in intensity. As the intensity of the measured tone was varied, the size of the effect (in dB) remained constant.

Author (TAB)

N66-29803# George Washington Univ., Washington, D. C. Human Resources Research Office.

THE INFLUENCE OF PRACTICE FRAMES AND VERBAL ABILITY ON PROGRAMMED INSTRUCTION PERFORMANCE

William H. Melching and Frank B. Nelson Jan. 1966 28 p refs
(Contract DA 44-188-ARO-2)
(HumRRO-TR-66-1; AD-628444) CFSTI: HC \$2.60/MF \$0.50

The effect of special practice frames upon programed instruction performance was examined using a program in counterinsurgency. The individuals who served as subjects represented two levels of verbal ability. Practice frames enabled subjects to proceed through the program at a faster rate per frame, make fewer program errors, and score higher on a recall type of achievement test. Subjects of higher verbal ability were able to proceed through the program at a faster rate, make fewer program errors, and exhibit higher scores on all measures of achievement. Author (TAB)

N66-29815# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HISTOMORPHOLOGICAL CHANGES IN THE INTERNAL EAR OF DOGS UNDER THE EFFECT OF RADIAL ACCELERATIONS

S. S. Markaryan and R. Ye. Kogan 17 Mar. 1966 13 p refs
Transl. into ENGLISH from Vestn. Otorinolaringol. (Moscow), no. 2, 1964 p 17-21
(FTD-TT-65-1356/1+2+4; TT-66-60995; AD-631991)
CFSTI: HC \$1.60/MF \$0.50

Twelve dogs were subjected to the action of accelerations within the limits of 2.4-14.5g, the time ranging from 4 to 20 minutes. In the internal ear of dogs, the venous circulation became disturbed, this resulting in protracted hemorrhages in the perilymphatic spaces of the cochlea and subepithelial connective tissue of sacc and ampules. Hemorrhages in the internal ear resolved much slower than hemorrhages occurring in the middle ear or in the internal acoustic meatus.

Author (TAB)

N66-29837# National Univ. of Ireland, Dublin. Unit of Cell Metabolism.

ACTIVE TRANSPORT OF IONS Final Scientific Report
Edward J. Conway 27 Feb. 1966 4 p
(Contract AF 61(052)-852)

(AFOSR-66-0717; AD-632305) CFSTI: HC \$1.00/MF \$0.50
Research studies conducted to examine the concept of the critical energy barrier as applied to isolated frog muscles loaded with sodium are summarized. The physiological K-carrier in yeast is identified as the most important finding in relation to the active transport of ions. It is pointed out that the system in yeast concerned with the active transport of potassium is contained in the yeast cell walls; at a pH of about 7 this physiological K-carrier can actively transport any inorganic ion, provided it is present in sufficient concentration outside (about 0.2 M). However, it transports inorganic ions at different rates, depending on the affinity of the ion for the carrier. Two theories on the mechanism of this active transport, and the transference of an ion from a lower to a higher electrochemical potential with input of the necessary energy are discussed. Electron microscope examinations of three membrane barriers in frog skeletal muscles, with respect to sodium entrance at 0° to 4°C in the absence of external potassium, are also reported. M.G.J.

N66-29855# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE ASSAULT ON OUTER SPACE GOES ON
29 Apr. 1966 7 p Transl. into ENGLISH from Tekhn. i Vooruzheniye (USSR), no. 10, 1964 p 2-3
(FTD-TT-65-1903/1+4; AD-632313) CFSTI: HC \$1.00/MF \$0.50

Our Socialistic Fatherland has gone out to new boundaries in the development of astronautics. A powerful rocket carrier first took out into the endless distances of outer space the multiple-place spaceship, the Voskhod, aboard which there was laboring to accomplish their goal, carrying out a complicated and multilateral program of scientific investigations, a friendly group of astronauts, an engineer, a scientist, and a physician. These researches have uniquely important significance for further long flights of the crews of spaceships. Three in outer space on one ship—such a thing has never happened before, and from the moment when the Voskhod soared upward into the skies and went into its assigned orbit from all corners of our planet there flowed in greetings addressed to the Soviet people and its glorious sons, V. M. Komarov, K. P. Feoktistov, and B. B. Yegorov. The Soviet Union in opening up a new era in the history of mankind maintains the primacy, true to natural law, in the exploration and conquest of outer space, for this serious affair proves to be a component part of that gigantic creative work which the Soviet people is carrying on in accordance with the general line of the Communist Party in all branches of economy, science, and culture in the name of mankind for the benefit of mankind. TAB

N66-29869*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SEXTANT SIGHTING PERFORMANCE IN MEASURING THE ANGLE BETWEEN A STATIONARY SIMULATED STAR AND A STATIONARY BLINKING LIGHT

Robert J. Randle, Bedford A. Lampkin, and Emmett C. Lampkin Washington, NASA, Jul. 1966 27 p refs
(NASA-TN-D-3506) CFSTI: HC \$1.00/MF \$0.50 CSCL 05H

In space flight, the target vehicle in a rendezvous maneuver might carry a high intensity blinking light as a marker and navigation aid for the chase vehicle. The present study was made to determine the ability of subjects to measure the angle between a simulated star and a blinking point of light of the same magnitude as the star. The subjects were eight male junior college students with normal visual acuity. Four were pretrained on the task and four were trained using as targets a simulated star and a steady light. The blinking light was given three levels of frequency and on-time, making possible nine experimental conditions. Two steady stars were used as a control. A Plath micrometer marine sextant was used to measure the angle by star superposition. There was no relative motion between the two targets. The sextant was mounted and did not need to be supported by the subject. The angle was measured with a digital encoder attached to the sextant vernier shaft. Performance decreased at the shorter on-times, in terms of larger variability in measured angle, and at the lower frequencies, in terms of longer sighting time.

Author

N66-29877# Joint Publications Research Service, Washington, D. C.

SOME EFFECTS OF THE FLIGHT OF THE KOSMOS-110 ON THE TEST DOGS

V. Pravetskiy, N. Gurovskiy, B. Yegorov, and A. Kiselev 24 Jun. 1966 10 p Transl. into ENGLISH from Pravda (Moscow), 17 May 1966 p 6
(JPRS-36182; TT-66-32616) CFSTI: \$1.00

Physiological data collected on the test dogs aboard the Kosmos 110 satellite, and the conclusions drawn from them concerning the effects of prolonged weightlessness are presented. (1) A significant decrease in the volume of muscular mass and disruption of coordination were observed. Pre-flight coordination level was not reattained until 8 to 10 days

*after return to earth. (2) A heightened calcium content was discovered in the urine and blood. (3) The marked thinness of the animals was felt to be caused by decrease in muscular mass and slight dehydration. (4) At the beginning of the flight abrupt fluctuations in the heart beat were noted; after 10 to 14 days the pulse dropped to a normal level. After the flight an increase was again noted, but by the fourth day on earth it returned to normal. (5) Several days after the flight a marked increase in the erythrocyte sedimentation reaction and an increase in leucocytes were noted. It was concluded that this was a reaction to normal gravity conditions after weightlessness. (6) Changes evidenced in the fermentation function of the intestines ceased 6 or 7 days after the flight and were felt to be associated with change from space to normal diet. L.E.W.

N66-29878# Joint Publications Research Service, Washington, D. C.

STUDIES ON WORK FITNESS AND WORK ARRANGEMENTS

P. A. Makkaveyskiy 23 Jun. 1966 25 p refs Transl. into ENGLISH from Ekspertiza Trudospособnosti i Trudoustroystvo pri Nervynykh i Psikhicheskikh Zabolevaniyakh (Leningrad), 1965 p 5-17, 121-127

(JPRS-36164; TT-66-32598) CFSTI: \$2.00

The problems involved in reducing and preventing the disability associated with nervous disorders are examined, in relation to the preservation and proper utilization of manpower resources and the impact of such disabilities on the Soviet social system. The medical evaluation program is discussed, and recommendations for implementing it are proposed. These include early diagnosis and treatment, clinical observation and proper work arrangements for chronic cases, and retraining to achieve functional rehabilitation. Statistical data are also presented on more than 300 persons who were exposed to protracted superhigh frequency electromagnetic radiation, ranging in intensity from 70 to 200 $\mu\text{w}/\text{cm}^2$ for six hours daily. Results indicate that chronic exposure may produce autonomic symptoms accompanied by diencephalic crises; however, the functional changes tend to disappear after appropriate treatment and transfer to other types of work. M.G.J.

N66-29887# Cajal Inst., Madrid (Spain). Dept. of Biophysics.
NEURONAL PATTERNS ASSOCIATED WITH AFFECTIVE RESPONSES Final Scientific Report

A. Fernandez de Molina 28 Feb. 1966 9 p refs
(Grant AF-EOAR-65-55)

(AFOSR-66-0713; AD-632269) CFSTI: HC \$1.00/MF \$0.50

The distribution and properties of the mass responses generated in the basal telencephalon and diencephalon after electrical stimulation of the basolateral and medial amygdala were analyzed in cats anesthetized with chloralose. Two groups of fibers were found in the stria terminalis with a conduction velocity of 2.7-3.4 and 0.7-1 m/sec, respectively. Twenty five neuronal units were analyzed in the septum, anterior and dorsolateral hypothalamus and nucleus ventromedialis, the main emphasis being made on their firing patterns and temporal capabilities. Author (TAB)

N66-29895# School of Aerospace Medicine, Brooks AFB, Tex.
THE PREPARATION OF PAROTID FLUID PROTEIN-FREE FILTRATES Final Report, Feb.-Jun. 1965

A. Stewart Windeler, Jr. and Ira L. Shannon Mar. 1966 11 p refs

(SAM-TR-66-25; AD-632509) CFSTI: HC \$1.00/MF \$0.50

The effectiveness of nine methods for precipitating protein in parotid fluid was investigated. Measurement was made of total nitrogen concentration and total protein concentration on the protein-free filtrates. Nitrogen measurements were performed by a semi-micro-Kjeldahl procedure and the proteins were measured by the Lowry method. Three methods were found to remove all of the protein: (1) An acetic acid in acetone method. (2) Somogyi's copper sulfate method. (3) Somogyi's barium hydroxide method. The two Somogyi methods removed uric acid in addition to the protein. Author (TAB)

N66-29946# Systems Research Labs., Inc., Dayton, Ohio.
FREQUENCY ANALYSIS OF KOROTKOV BLOOD PRESSURE SOUNDS USING THE FOURIER TRANSFORM Final Report

Thomas Rauterkus, John F. Feltz, and Jay W. Fickes Brooks AFB, Tex., USAF School of Aerospace Medicine, Feb. 1966 53 p refs

(Contract AF 41(609)-2753)

(SAM-TR-66-8; AD-632483) CFSTI: HC \$3.00/MF \$0.50

The purpose of this investigation was to determine the frequency content of the sound signals (Korotkov sounds) obtained from the microphone located in the arm cuff of an automatic blood pressure measuring instrument. Korotkov sound recordings were made for five subjects in five experimental situations: rest, postexercise, passive tilting, centrifuge rides, and flights in NF-100 aircraft. The frequency analysis was performed by using a digital computer to obtain the Fourier transforms of the sound signals. The Fourier transforms were displayed on the computer oscilloscope and photographed. The photographs were then arranged in a number of rectangular arrays for convenient comparison of the frequency content of the Korotkov sounds as related to the several types of Korotkov sounds, experimental situations, and subjects. Initial study of the 240 average Fourier transforms contained in these arrays indicates no readily observable common characteristics except that most of the sound energy is almost always located below 50 cps.

Author (TAB)

1966

IAA ENTRIES

A66-28487**CIRCADIAN RHYTHMS IN RATS - EFFECTS OF RANDOM LIGHT-ING.**

D. L. Holmquest, K. Retiene, and H. S. Lipscomb (Baylor University, College of Medicine, Dept. of Physiology, Houston, Tex.). *Science*, vol. 152, Apr. 29, 1966, p. 662-664. 8 refs.

National Institutes of Health Grant No. 4122; Grant No. NAS 9-2323.

Increase in body weight, spontaneous running activity, and adrenal cortical function have been studied in rats exposed to a random lighting schedule. In two separate experiments, grouped control animals were given 12 or 14 hr of light alternating with 12 or 10 hr of darkness, respectively, while corresponding grouped experimental animals were given the same total amounts of light and darkness per 24-hr period in a randomized pattern. Random light for periods of 17 to 40 days exerted no influence on growth rate, on weights of endocrine organs, or on adrenal response to adrenocorticotrophic hormone. However, the physiological fluctuation of group running activity and adrenal steroid secretion was abolished. Group desynchronization and the development of circadian rhythms having periods both shorter and longer than 24 hr appear to have replaced the synchronized group rhythmicity. (Author)

A66-28502 #

SOME RESULTS OF MEDICAL OBSERVATIONS ON SPACEMEN P. I. BELIAEV AND A. A. LEONOV DURING TRAINING AND THE ORBITAL FLIGHT [NEKOTORYE REZUL'TATY VRACHEBNOGO KONTROLIA ZA SOSTOYANIEM KOSMONAVTOV P. I. BELIAEVA I A. A. LEONOVA VO VREMIA TRENIROVOK I ORBITAL'NOGO POLETA].

I. T. Akulinichev, A. S. Antoshchenko, V. A. Znachko, A. E. Ivanov, V. L. Lebedev, D. G. Maksimov, A. E. Uglov, and G. F. Khlebnikov.

Kosmicheskie Issledovaniia, vol. 4, Mar.-Apr. 1966, p. 311-319. 6 refs. In Russian.

Discussion of the results of medical tests on spacemen Beliaev and Leonov, made during high-altitude training in a pressure chamber (at altitudes of 5, 10, and 32 to 36 km), during the execution of flight assignments in a training spacecraft, and during Leonov's spacewalk outside the Voskhod 2 spaceship. Temporary minor disorders are established in the physiological functions of both. The condition is linked to emotional and physical stresses. V. Z.

A66-28503 #

EFFECT OF SPACEFLIGHT CONDITIONS ON WHEAT SEEDS AND PLANTS GROWN FROM THE SEEDS [VLIYANIE FAKTOROV KOSMICHESKOGO POLETA NA SEMENA PSHENITSY I VYROSHCHIE IZ NIKH RASTENIIA].

G. V. Il'ina, N. N. Kuznetsova, S. G. Rydkii, and V. G. Vysotskii. *Kosmicheskie Issledovaniia*, vol. 4, Mar.-Apr. 1966, p. 320-323. In Russian.

Study of the growth and development of wheat plants that had been carried on board the Vostok 5 and 6 spaceships. Some symptoms of depression are established in the germinating and sprouting capacities. No substantial changes were established either in carbohydrate and protein metabolism during vegetation or in the chemical composition of the seeds. V. Z.

A66-28616

EFFECTS OF α -GLYCEROPHOSPHATE AND OF PALMITYL-COENZYME A ON LIPID SYNTHESIS IN YEAST EXTRACTS.

David White and Harold P. Klein (NASA, Ames Research Center, Aerobiology Div., Moffett Field, Calif.).

Journal of Bacteriology, vol. 91, Mar. 1966, p. 1218-1223. 20 refs.

The incorporation of acetate into fatty acids, but not into non-saponifiable lipids, was stimulated by α -glycerophosphate in a supernatant fraction of *Saccharomyces cerevisiae*, obtained after centrifugation at 86,000 \times g for 60 min. There was a pronounced effect

at concentrations below 2 mM, but at concentrations above 5 mM α -glycerophosphate was relatively less stimulatory. α -Glycerophosphate markedly increased the percentage of esterified fatty acids among the products, and the formation of both saturated and unsaturated fatty acids was stimulated. Palmityl-coenzyme A inhibited fatty acid synthesis, affecting the formation of unsaturated acids more severely than saturated acids. In the presence of sufficient α -glycerophosphate to alleviate these inhibitions, palmityl-coenzyme A still reduced the formation of certain unsaturated fatty acids.

(Author)

A66-28653

THE STERILIZED SPACECRAFT.

Frank J. Granzier.

Motorola Monitor, vol. 4, no. 2, 1966, p. 4-8.

Discussion of certain problems arising in connection with the sterilization of spacecraft. A program for sterilizing and life-testing silicon transistors is described. Heat sterilization is said to pose acute problems, such as an increase in the capacitance and dissipation factors of ceramic capacitors and a decrease in the insulation resistance of solid-state tantalum capacitors. The problem of re-sterilizing an assembled spaceship to counteract recontamination of the components is considered. The effect of the Martian atmosphere, magnetic field, and radiation field on the spaceship is discussed.

A. B. K.

A66-28655

EFFECTS OF AMBIENT PRESSURE ON THE TOLERANCE OF MICE TO AIR BLAST.

Edward G. Damon, Donald R. Richmond (Lovelace Foundation for Medical Education and Research, Dept. of Comparative Environmental Biology, Albuquerque, N. Mex.), and Clayton S. White (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 341-347. 15 refs.

Contract No. DA-49-146-XZ-055.

Mice were exposed to overpressures of "long" duration in the expansion chamber of an air-driven shock tube inside which the initial, preblast pressures were varied over sixfold. When the animals were held at the initial pressure for 1 hr following the blast before being returned to the ambient pressure of the laboratory, tolerance values, expressed as LD₅₀-1-hr gage pressures, increased fourfold; they were 20.3, 31.0, 44.5, 55.4, and 91.8 psi for initial pressures of 7, 12, 18, 24, and 42 psia, respectively. When animals were returned to ambient level soon after blast exposure, the LD₅₀ pressures were lower than the above values for initial pressures greater than ambient, and higher for initial pressures lower than ambient. The feasibility of scaling biological blast effects as a function of altitude was discussed and one approach suggested by available empirical data was regarded as a promising, but tentative procedure. (Author)

A66-28656

CURRENT CONCEPTS AND PRACTICES APPLICABLE TO THE CONTROL OF BODY HEAT LOSS IN AIRCREW SUBJECTED TO WATER IMMERSION.

E. L. Beckman, E. Reeves, and R. F. Goldman (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.; U.S. Army Research Institute of Environmental Medicine, Natick, Mass.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 348-357. 25 refs.

Navy-supported research.

Review of the basic physical and physiological concepts pertaining to the problem of limiting thermal loss from the immersed human body. The effects of sudden immersion in freezing water on the human body are discussed, as well as biological methods of controlling thermal balance in unprotected individuals. The newer technical developments in insulative clothing and supplemental heating systems are reviewed and discussed, touching upon the use of neoprene insulation, electrically heated garments using resistance wires and batteries, and the use of heating systems employing thermoelectric generators, catalytic fuel cells, and exothermic chemical reactions. A description is given of a "water-conditioned" suit under development for NASA.

A. B. K.

A66-28657**INFLUENCE OF LONG-TERM LOWER BODY NEGATIVE PRESSURE ON THE CIRCULATORY FUNCTION OF MAN DURING PROLONGED BED REST.**

Paul M. Stevens, Perry B. Miller, Charles A. Gilbert, Theodore N. Lynch, Robert L. Johnson, and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Aerospace Medical Sciences Div., Internal Medicine Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 357-367. 21 refs.

Exposure to lower body negative pressure for 8 hr a day during a four-week period of absolute bed rest has been shown to significantly maintain orthostatic intolerance and plasma volume. A mean plasma volume loss of 332 cc was seen in the control subjects who were at pure bed rest while test subjects exposed daily to L.B.N.P. (lower body negative pressure) during bed rest showed no significant change from baseline. Following bed rest, resting recumbent heart rates were significantly higher in control subjects but unchanged in the test subjects; orthostatic heart rates although higher in both groups increased significantly less in the test subjects. Following bed rest the incidence of syncope was significantly higher in the control subjects but was unchanged from before bed rest in the test subjects. Hemodynamic cardiovascular measurements suggest that in response to acute sustained L.B.N.P. following bed rest, test subjects have a smaller increase in heart rate while the cardiac index decreases less than in the controls. Resting recumbent forearm blood flow is lower following four weeks of bed rest with L.B.N.P. than following bed rest alone. The increase in venous tone which occurs in response to acute exposure to L.B.N.P. is not apparent following pure bed rest but persists following bed rest with L.B.N.P. conditioning. Potential mechanisms responsible for these findings and their implications are discussed. (Author)

A66-28658**EFFECT OF DISCONTINUOUS EXPOSURE OF RATS TO A HIGH OXYGEN-LOW PRESSURE ENVIRONMENT.**

John Patrick Jordan, John B. Allred, Charles L. Cahill, and Robert T. Clark (Oklahoma City University, Dept. of Chemistry, Oklahoma City, Okla.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 368-371. 9 refs.

Grant No. NSG-300-63.

The effect of a simulated space capsule environment (5.2 psia and 94% O₂) on the metabolism of 350-420 g rats was studied after an exposure of 8 hr per day for 36 days. No significant differences were observed in body weight or organ weights when compared with control animals which were maintained under normal atmospheric conditions. After injecting pairs of rats with acetate-2-C¹⁴ at varying times prior to sacrifice, the turnover rates of lipids were studied in liver, heart and kidney. The expiration rate of C¹⁴O₂ was also determined. In general, the metabolic rate of the experimental animals was reduced at least 10%; metabolically the animals did not appear to adapt to the environment over the 36-day test period. Major alterations were observed in the metabolism of lipids, particularly fatty acids. (Author)

A66-28659

HYPOXEMIA INDUCED IN MAN BY SUSTAINED FORWARD-ACCELERATION WHILE BREATHING PURE OXYGEN IN A FIVE POUNDS PER SQUARE INCH ABSOLUTE ENVIRONMENT.
W. C. Alexander, R. J. Sever, and F. G. Hoppin, Jr. (NASA, Manned Spacecraft Center, Houston, Tex.; U.S. Naval Air Development Center, Aviation Medical Acceleration Laboratory, Johnsville, Pa.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 372-378. 17 refs.

Presently planned atmospheric entry missions were simulated with respect to predicted acceleration profiles and gaseous environment. Arterial oxygen saturation was measured by earpiece oximetry calibrated with Van Slyke analyses of arterial blood samples collected simultaneously under acceleration. The patterns and severity of hypoxemia were studied by varying the magnitude and duration of the acceleration exposure and the environment of the pilot. The patterns and severity of hypoxemia induced by forward acceleration were shown to vary as a function of the magnitude and

duration of the exposure and the gaseous environment of the experimental subject. Saturation levels below 80% were uncommon under the conditions of this simulation; however, marked deviations from this value were encountered. Although the present investigation was designed to evaluate the tolerability of the space crew to the dynamic and environmental conditions of manned earth entry characteristics of the Apollo mission, some relevant findings concerning the probable mechanisms of acceleration-induced hypoxemia are discussed. (Author)

A66-28660**USE OF TWO QUALITATIVE INDICES AS PREDICTORS OF SUCCESS IN FLIGHT TRAINING.**

Paul Richard Jeanneret (U.S. Atlantic Fleet, U.S. Naval Air Station, Norfolk, Va.) and Charles W. Hutchins, Jr. (U.S. Naval Aviation Medical Center, U.S. Naval Aerospace Medical Institute, Pensacola, Fla.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 379-382.

Two qualitative variables, procurement source and military rank, were employed to supplement the current multiple prediction formulas that identify students with low probabilities of successfully completing the U.S. Navy Flight Training Program. Also two dichotomous criterion variables, completion vs attrition and voluntary withdrawal vs all other attrition, were created, and the Wherry-Doolittle method of test selection was used to compute multiple prediction formulas for both criteria. The results indicated that the inclusion of the qualitative variables increased the multiple correlations in every case for both criteria. Since these preliminary findings are encouraging, the next step must be to include all qualitative variables available in one intercorrelation matrix and determine the total benefit to the multiple prediction formulas accruing from this method. (Author)

A66-28661**EFFECTS OF SHORT-TERM BED REST AND WATER IMMERSION ON PLASMA VOLUME AND CATECHOLAMINE RESPONSE TO TILTING.**

Daniel E. Torphy (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch, Acceleration Section, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 383-387. 26 refs.

Study of the effect of six hours of bed rest or water immersion on plasma volume and catecholamine excretion of subjects undergoing tilting tests. It is found that the urinary excretion of norepinephrine and epinephrine measured in five subjects when tilted to 44° after six hours of either normal activity, recumbent inactivity, or immersed inactivity show the same expected rise, regardless of the preceding condition, thus suggesting that vasoconstrictive response to orthostasis, as evidenced by norepinephrine excretion, is not impaired by six hours of immersion. Plasma volume measured before and after six hours of normal activity, recumbent inactivity, immersed activity, and immersed inactivity is found to show mean plasma-volume changes of +114, -146, -284, and -290 ml, respectively, thus indicating that recumbency reduces plasma volume and immersion reduces it further. Fluid volume loss is considered as a possible primary cause of orthostatic intolerance following water immersion experiments. A. B. K.

A66-28662**IN-FLIGHT RESPONSE TO A NEW NON-GYROSCOPIC BLIND FLIGHT INSTRUMENT.**

Stanley R. Mohler and A. Howard Hasbrook (Federal Aviation Agency, Office of Aviation Medicine, Aeromedical Applications Div., Washington, D.C.).

(Flying Physicians Association, Aerospace Medical Association, Meeting, New York, N.Y., Apr. 26-29, 1965, Paper.)

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 388-394.

Pilot responses to a new "geomagnetic" nongyroscopic blind flight instrument were recorded during flight, utilizing an aircraft typical of those flown by many general aviation pilots. Data were obtained under induced conditions of loss of control during simulated instrument flight utilizing subjects ranging from student pilots with as little as 6 hr flight time to commercial pilots with up to 10,000 hr experience. The device used in tests of human response during

simulated blind flight is the Kenyon Instrument. This is a small, light-weight, self-contained instrument which requires neither electrical power nor vacuum source. It is nontumbling and is not susceptible to turbulence. Comparisons of pilot response with the Kenyon Instrument and the conventional "turn and bank" instrument were an integral part of the tests. More positive and smooth control was obtained with the new instrument. Also, there was a marked decrease in onset and severity of vertigo with the Kenyon Instrument. (Author)

A66-28663

HUMAN RESPONSE TO PREDICTED APOLLO LANDING IMPACTS IN SELECTED BODY ORIENTATIONS.

William K. Brown, Jerry D. Rothstein, and Peter Foster (USAF, Office of Aerospace Research, Aeromedical Research Laboratory, Bio-Effects Div., Biodynamics Branch, Holloman AFB, N. Mex.). *Aerospace Medicine*, vol. 37, Section 1, Apr. 1966, p. 394-398.

14 refs.

NASA-supported research.

Two hundred eighty-eight human impact experiments were accomplished on a linear decelerating device (the Daisy Decelerator) for the purpose of studying human response to G forces in certain body orientations likely to occur during impact of the Apollo command module. A proposed Apollo restraint system was used in all human tests. It was observed that impact forces produced effects on the nervous, cardiorespiratory and musculoskeletal systems. Neurological effects of impact were momentary stunning and disorientation. A consistent effect on the cardiovascular system was transitory post-impact slowing of the heart rate in those body orientations in which the decelerative force acts in a footward direction (inertial force acts headward). A theory is presented to explain this effect. Respiratory effects of impact were momentary shortness of breath and chest pain. Effects on the musculoskeletal system were soreness and spasm of muscle groups of the neck and back. Since no effect on the human subject was severe enough to exceed human tolerance, the test program results demonstrate that man can endure certain predicted Apollo landing impact forces in different body orientations without significant incapacitation or undue pain.

(Author)

A66-28664

OTOLITH ORGAN ACTIVITY WITHIN EARTH STANDARD, ONE-HALF STANDARD AND ZERO GRAVITY ENVIRONMENTS.

Earl F. Miller, II, Ashton Graybiel, and Robert S. Kellogg (U.S. Naval Aviation Medical Center, U.S. Naval Aerospace Medical Institute, Pensacola, Fla.).

Aerospace Medicine, vol. 37, Section 1, Apr. 1966, p. 399-403.

22 refs.

USAF-sponsored research.

The objectives of the experiment were to measure otolith activity as indicated by ocular counterrolling response to body tilt within a force field of zero G, one-half, and standard G and to determine the effect of extralabyrinthine factors upon counterrolling under these gravitational conditions. Six individuals with bilateral labyrinthine defects and seven normal persons served as subjects. Transient periods of subgravity force (0.5 G, zero G) were produced by parabolic flight maneuvers in a specially equipped aircraft (C-131B) which accommodated a tilt chair and accessory apparatus for recording counterrolling response at upright and with body tilt ($\pm 25^\circ$, $\pm 50^\circ$). Testing under 1.0 G conditions was accomplished during periods of straight and level flight. The labyrinthine-defective (L-D) group revealed results which were qualitatively similar to those from the normal group but markedly reduced in magnitude. This demonstrated that extralabyrinthine factors were not significantly influencing extraocular muscle tonus, and that ocular counterrolling served as a valid and sensitive indicator of otolith activity under hypogravic conditions. In the normal subjects zero G induced a physiological deafferentation of the otolith organs as indicated by the lack of any significant counterrolling response when the subjects were tilted rightward or leftward up to 50° . When the gravitational force equalled approximately 0.5 G, the magnitude of counterrolling fell substantially below the level midway between the zero and earth standard gravity response. The nonlinear relationship between otolith activity and subgravity force that is implied in these data and confirmed in a follow-up study is discussed.

(Author)

A66-28665

MEDICAL ASPECTS OF AIRCRAFT PILOT FATIGUE WITH SPECIAL REFERENCE TO THE COMMERCIAL JET PILOT.

Otis B. Schreuder.

Aerospace Medicine, vol. 37, Apr. 1966, 48 p.

Research supported by the Air Transport Association of America.

Analysis of various aspects of aircraft pilot fatigue for determining the severity of the problem, including the medical implications of socio-economic and off-duty activities. It is concluded that the occurrence of pilot fatigue as defined is not common in the airline pilot, that in the same age bracket the airline pilot is healthier than the general male population, and that there is nothing to indicate that flying the turbojet is deleterious to health or conducive to premature aging. It can also be stated that the circadian rhythm is a definite physiological phenomenon. Nevertheless, there is some adaptation, and additionally, a major percentage of the pilot group experience very little difficulty in compensating for this phenomenon.

M. M.

A66-28671

THE PHYSICAL BASIS OF LIFE AND LEARNING.

Francis O. Schmitt (Massachusetts Institute of Technology, Dept. of Biology, Cambridge, Mass.).

Science, vol. 149, Aug. 27, 1965, p. 931-936. 19 refs.

Research supported by the Massachusetts Institute of Technology, the Neurosciences Research Foundation, the Rogosin Foundation, and the Louis and Eugenie Marron Foundation; National Institutes of Health Grants No. NB-00024-15; No. GM-10211-03; Grant No. NSG-462; Contracts No. Nonr-1841(27); No. Nonr(G)-00089-64.

Investigation of the physicochemical processes underlying memory, learning, consciousness, and other mental processes in man. The controversy between proponents of chromosome and molecular genetic determination is reviewed. The role of molecular recognition of coded information in gene control and immunological processes is discussed. The present state of development of the behavioral sciences and neurosciences is outlined, emphasizing studies of neuronal circuitry. Neurobiological evidence for the primary role of molecular recognition of coded information stored in macromolecules of the brain cells is cited, together with the results of certain experiments in applying antisera against specific parts of the brains of animals.

A. B. K.

A66-28682

ARTIFICIAL GRAVITY IN SPACECRAFT [KÜNSTLICHE SCHWERKRAFT IN RAUMFAHRZEUGEN].

M. Nieto Boqué (Hermann-Oberth-Gesellschaft, Abteilung Spanien, Barcelona, Spain).

Astronautik, vol. 3, Mar.-Apr. 1966, p. 45-48. In German.

Review of the techniques for simulating induced gravity and a consideration of the psychological and physiological phenomena caused by the Coriolis effect. There is experimental evidence that in the prolonged absence of any gravitational field marked mental and metabolic changes develop in human beings. A formula is given for expressing the degree of simulated gravity caused by a given centrifugal force. The Coriolis effect is analyzed in terms of three components - (1) translational motion in the direction of the radius, (2) tangential motion, and (3) motion parallel to the axis. The experimental results of tests simulating the environment in a rotating space station are described.

D. P. F.

A66-28684

REQUIREMENTS AND PROBLEMS IN THE STERILIZATION OF PLANETARY PROBES [NOTWENDIGKEIT UND PROBLEME DER STERILISATION VON PLANETENSONDEN].

Horst W. Köhler.

Astronautik, vol. 3, Mar.-Apr. 1966, p. 54. In German.

Consideration of the problems encountered in decontaminating planetary probes - such as those directed at Mars and Venus - to free them from microorganisms of terrestrial origin. The very high resistance of certain microorganisms to adverse environments is stressed and some examples are given. This degree of resistivity implies that no one process of sterilization is adequate and that a combination of several or all of them should be applied to decontaminate planetary probes. Exposure to UV radiation, gas sterilization (ethylene oxide), and exposure to heat have all been used with varying degrees of

success. The conflict between the degrading effect of the sterilization process on space vehicle hardware and the rigid decontamination requirements creates a very serious problem. D. P. F.

A66-28740

VIBRATION-INDUCED CHANGE IN THE STABILITY OF AN ANIMAL ORGANISM DUE TO THE EFFECTS OF CERTAIN CHEMICAL PREPARATIONS AND PHYSICAL STRAIN [IZMENENIE USTOICHIVOSTI ORGANIZMA ZHIVOTNYKH POD VLIANIEM VIBRATSII K VOZDEISTVIU NEKOTORYKH KHIMICHESKIKH PREPARATOV I FIZICHESKOI NAGRUZKI].

V. A. Kozlov, P. P. Saksonov, N. N. Dobrov, V. V. Antipov, and V. S. Parshin. *Akademiia Nauk SSSR, Doklady*, vol. 167, Apr. 1, 1966, p. 925-927. 6 refs. In Russian.

Investigation of the effect of cystamine hydrochloride, strychnine nitrate, and hexobarbital injections on mice subjected to vibration and of the effect of vibration on their swimming capability. V. Z.

A66-28744

SIMULATING SST OPERATIONS - THE BACKGROUND.

Joseph P. O'Brien (Federal Aviation Agency, Systems Research and Development Service, Terminal Section, Atlantic City, N. J.) and Richard H. Sawyer (NASA, Langley Research Center, Hampton, Va.).

Astronautics and Aeronautics, vol. 4, May 1966, p. 76, 77.

Description of equipment used to simulate SST operations. A fixed-base SST simulator used at Langley Research Center is equipped with an analog computer facility for solving the six-degree-of-freedom motion equations for an aircraft having the characteristics of the SST designs under study. The air-traffic environment is simulated at the National Aviation Facilities Experimental Center by an ATC simulator and a peak-day sample of air traffic simulated by 60 radar target generators. A. B. K.

A66-28844

COMMENTS ON OPTICAL ART.

William C. Hoffman (Oregon State University, Corvallis, Ore.).

Applied Optics, vol. 5, May 1966, p. 873, 874. 11 refs.

Analysis of the mechanism of visual perception in which it is shown that the seat of appreciation of optical art in man is more cortical than retinal. Although eye movements, retinal stimulation, and pressure upon the eye can evoke phenomena typical of optical art, they are sufficient but not a requirement. Stimulation of the visual cortex by any means, retinal or otherwise, appears to be the essential requirement. The kinds of symmetries characteristic of optical art are built-in in the visual cortex via the cortical counterparts of the Lie transformation groups that characterize the several perceptual constancies. The results of electrode stimulation of the surface of the visual cortex during open brain operations evokes patterns typical of optical art which is further proof of the cortical nature of optical aesthetic appreciation. D. P. F.

A66-28868

BLOOD GLUCOSE AND CORTICOSTERONE CHANGES ACCOMPANYING ALTERED LIPID METABOLISM INDUCED BY EXPOSURE TO ACCELERATION STRESS.

D. D. Feller and E. D. Neville (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

Society for Experimental Biology and Medicine, Proceedings, vol. 121, 1966, p. 223-227. 11 refs.

Experimental investigation of fasted, male, Sprague-Dawley rats exposed to 4.7 g for time periods of up to 24 hr. Plasma glucose, plasma corticosterone, liver lipids, and the incorporation of acetate- $1\text{-}^{14}\text{C}$ into fatty acids in liver slices were followed in rats exposed for periods of 1 to 24 hr. Plasma glucose and plasma corticosterone curves were bimodal, showing an early maximum during the first 3 hr of exposure and rising after 5 hr through the 24-hr study. It is concluded that changes in fat metabolism induced by acceleration stress were mediated in part by changes in levels of circulating glucose, corticosterone, or the interaction of both. M. L.

A66-29439

PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965. 716 p. In Russian.

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REACTION OF A HUMAN ORGANISM TO LANDING IMPACT OVERLOAD ACTING IN VARIOUS DIRECTIONS [REAKTSIIA ORGANIZMA CHELOVEKA NA DEISTVIE PEREGRUZOK PRIZEMLENIIA, DEISTVUIUSHCHIKH V RAZLICHNYKH NAPRAVLENIYAKH]. G. P. Mirolubov, p. 44-53. 27 refs. [See A66-29445 15-05]

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COURSE AND RESULTS OF COOLING A BODY BY THE METHOD OF REGULATED HYPERTHERMIA [TECHENIE I POSLEDSTVIA OKHLAZHDENIYA TELA PO METODIKE REGULIRUEMOI GIPOTERMII]. G. N. Il'utkin, p. 593-597.

TREATING THE SECRETIONS OF A HUMAN WITH THE AID OF A NATURALLY FORMING ALGAL-BACTERIAL COLONY [PERERABOTKA VYDELENIY CHELOVEKA S POMOSHCH'U ESTESTVENNO SKLADYVAIUSHCHEGOSIA AL'GO-BAKTERIAL'NOGO SOOBSHCHESTVA]. M. S. Rerberg, T. I. Vorob'eva, R. I. Kuz'mina, and I. M. Barkhatova, p. 598-604. [See A66-29501 15-04]

SOME POSSIBILITIES OF PHYSIOLOGICAL INVESTIGATION OF THE VOCAL PROCESS IN CONNECTION WITH QUESTIONS OF PROVIDING VOCAL COMMUNICATION BETWEEN A MAN AND A MACHINE [NEKOTORYE VOZMOZHNOСТИ FIZIOLOGICHESKIKH ISSLEDOVANIY RECHEVOGO PROTSESSA V SVYAZI S VOPROSAMI OBESPECHENIYA RECHEVOI SVYAZI CHELOVEKA S MASHINOI]. V. A. Kozhevnikov and L. A. Chistovich, p. 605-613.

SOME METHODS OF REGISTERING AND PROCESSING INFORMATION DURING STUDIES OF THE ARTICULATORY INDICES OF SPEECH [NEKOTORYE PRIEMY REGISTRATSII I OBRABOTKI INFORMATSII PRI ISSLEDOVANIY ARTIKULIATORNYKH POKAZATELEY RECHI]. V. S. Shupliakov, p. 614-618.

ROLE OF VISUAL ARTICULATION IN SPEECH RECOGNITION [ROL' VIDIMOY ARTIKULIATSII V RASPOZNAVANIY RECHI]. V. V. Aliakrinskii, p. 619-630.

MEANS OF FORMULATION BY A HUMAN OF A SEQUENCE OF ACTIONS [K VOPROSU O SPOSOBAKH FORMIROVANIYA CHELOVEKOM POSLEDOVATEL'NOSTI DEISTVIY]. N. A. Rokotova, p. 631-641. 5 refs. [See A66-29502 15-05]

AUTOMATIC ANALYSIS OF THE PERIODIC DIURNAL VARIATIONS IN THE HUMAN ELECTROENCEPHALOGRAM [AVTOMATICHESKII ANALIZ SUTOCHNYKH PERIODICHESKIKH IZMENENIY ELEKTROENTSEFALOGRAMMY CHELOVEKA]. D. I. Ivanov, V. B. Malkin, V. L. Popkov, E. O. Popova, and I. N. Cherniakov, p. 642-645. 9 refs. [See A66-29503 15-04]

OBSERVATIONS ON FISH CONFINED IN SEALED AQUARIA WITH AND WITHOUT CHLORELLA [OPYT SODERZHANIYA RYB V GERMETICHESKIKH AKVARIUMAKH S KHILORELLOI I BEZ NEE]. L. M. Antsyshkina, N. S. Kirilenko, V. Ia. Mamontov, G. B. Mel'nikov, and F. P. Riabov, p. 646-654. [See A66-29504 15-04]

VARIANT METHOD OF DETERMINING THE MAXIMUM RATE OF PHOTOSYNTHESIS BY CHLORELLA [VARIANT OPREDELENIYA MAKSIMAL'NOGO FOTOSINTEZA KHILORELLY]. E. A. Ivanov, p. 655-657. [See A66-29505 15-04]

SENSORS FOR THE AUTOMATIC CONTROL AND REGULATION OF THE PHYSIOLOGICAL PROCESSES OF PLANTS IN CLOSED SYSTEMS [DATCHIKI DLIYA AVTOMATICHESKOGO KONTROLA I REGULIROVANIYA FIZIOLOGICHESKIKH PROTSESSOV RASTENII V ZAMKNUTYKH SISTEMAKH]. V. I. Rozhdestvenskii and V. G. Chuchkin, p. 658-669. 10 refs. [See A66-29506 15-05]

PECULIARITIES OF THE NUTRITION OF PLANTS GROWN IN AIR IN A CLOSED SYSTEM OF CULTIVATION [OB OSOBNOSTIYAKH PITANIYA RASTENII PRI VYRASHCHIVANIY IKH V VOZDUSHNOY KUL'TURE DLIYA ZAMKNUTOY SISTEMY]. I. V. Tsvetkova, Iu. I. Shaidarov, and V. M. Abramova, p. 670-675. 15 refs. [See A66-29507 15-04]

CONDITIONS OF CARBON NUTRITION FOR AN INTENSIVE CHLORELLA CULTURE [USLOVIA UGLERODNOGO PITANIYA KHILORELLY V INTENSIVNOY KUL'TURE]. G. I. Meleshko and L. M. Krasotchenko, p. 676-682. 8 refs. [See A66-29508 15-04]

DENSE CONTINUOUS CHLORELLA CULTURE AT VARIOUS ILLUMINATION LEVELS [PLOTNOSTNOE NEPRERYVNOE KUL'TIVIROVANIYE KHILORELLY PRI RAZLICHNYKH OSVESHCHENOSTIYAKH]. I. A. Terskov, I. I. Gitel'zon, F. Ia. Sid'ko, V. N. Belianin, B. G. Kovrov, I. S. Eroshin, and V. A. Batov, p. 683-686. [See A66-29509 15-04]

CONSUMPTION OF MINERAL-NUTRITION ELEMENTS BY CHLORELLA CELLS IN AN INTENSIVE CULTURE [POTREBLENIE ELEMENTOV MINERAL'NOGO PITANIYA KLETKAMI KHILORELLY V INTENSIVNOY KUL'TURE]. E. K. Lebedeva, G. I. Meleshko, and A. N. Shakhova, p. 687-693. 22 refs. [See A66-29510 15-04]

CHANGES IN THE HEMATOCRIT INDEX AND THE ARTERIAL BLOOD GAS COMPOSITION IN WHITE RATS DURING ARTIFICIAL HYPOTHERMIA [IZMENENIYA POKAZATELIA GEMATOKRITA I GAZOVOGO SOSTAVA ARTERIAL'NOY KROVI U BELYKH KRYIS PRI ISKUSSTVENNOY GIPOTERMII]. G. D. Glod, p. 694-700. 5 refs. [See A66-29511 15-04]

SIMULATION OF RADIATION CONDITIONS DURING THE OCCURRENCE OF A SOLAR FLARE ON A CIRCUMLUNAR TRAJECTORY [MODELIROVANIYE RADIATSIONNYKH USLOVIY PRI VOZNIKNOVENII SOLNECHNOY VSPYSHKI NA TRAEKTORII OBLETA LUNY]. V. S. Morozov, V. S. Shashkov, B. I. Davydov, V. V. Antipov, P. P. Saksonov, and N. N. Dobrov, p. 701-708. 12 refs. [See A66-29512 15-05]

CONCLUDING REMARKS [POSLESLOVIE], p. 709, 710.

A66-29440

TRAINERS FOR PREPARING COSMONAUTS FOR THE PROFESSIONAL ACTIVITY OF CONTROLLING A SPACECRAFT AND ITS SYSTEMS [TRENAZHERY DLIYA PODGOTOVKI KOSMONAVTOV K PROFESSIONAL'NOY DEYATEL'NOSTI PO UPRAVLENIY KORABLEM I EGO SISTEMAMI].

N. N. Gurovskii, V. G. Denisov, A. P. Kuz'minov, and M. M. Sil'vestrov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOY BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 3-9. In Russian.

Consideration of the design and operation of various training systems as aids in the development of professional habits and skills of spacecraft crews. Among those discussed are a universal multipurpose trainer, a complex trainer used in training the Vostok spacemen, and specialized functional trainers for specific single operations.

V. Z.

A66-29441

BASIC PRINCIPLES OF THE SPECIAL TRAINING OF COSMONAUTS [OSNOVNYE PRINTSIPI SPETSIAL'NOY TRENIROVKI KOSMONAVTOV].

N. N. Gurovskii, M. D. Emel'yanov, and E. A. Karpov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOY BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 10-16. In Russian.

General consideration of a program for the special training of spacemen, based on an analysis of the environmental factors affecting their physical and mental condition and the rated efficiency of men during spaceflights.

V. Z.

A66-29442

EXPERIMENTAL PSYCHOLOGICAL STUDY OF A GROUP OF SPACEMEN [EKSPERIMENTAL'NO-PSIKHOLOGICHESKOE ISSLEDOVANIYE GRUPPY KOSMONAVTOV].

F. D. Gorbov and M. A. Novikov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOY BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 17-26. In Russian.

Consideration of the purpose, techniques, and significant topics in the new science of space psychology. The diverse factors that determine the working conditions of a spaceflight are discussed. A program is outlined for the psychological testing of a team of spacemen. V. Z.

A66-29443 #

EFFECT OF 8 HR ISOLATION AND HYPOKINESIS ON SOME PHYSIOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF MAN [VLIANIE VOS'MICHASOVOI IZOLIATSII I GIPOKINEZII NA NEKOTORYE FIZIOLOGICHESKIE I BIOKHIMICHESKIE POKAZATELI U CHELOVEKA].

V. S. Georgievskii, L. I. Kakurin, A. N. Kalinina, B. S. Katkovskii, V. V. Kustov, V. I. Mikhailov, Z. I. Pilipiuk, and Iu. N. Tokarev.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 27-30. 6 refs. In Russian.

Observations of changes in the physiological and biochemical characteristics of 10 healthy men 21 to 24 years of age confined for 8 hr in a sealed chamber with forced aeration. Results of various physiological and biochemical tests on men fixed in chamber in the sitting position after rest or physical exercises are discussed. V. Z.

A66-29444 #

EFFECT ON THE HUMAN ORGANISM OF PROLONGED CONFINEMENT IN A SMALL SEALED CHAMBER [O VLIANII NA ORGANIZM CHELOVEKA DLITEL'NOGO PREBYVANIA V ZAMKNUTOI KAMERE MALOGO OB'EMA].

N. A. Agadzhanian, Iu. P. Bizin, G. P. Doronin, E. A. Il'in, A. G. Kuznetsov, and N. I. Ezepchuk.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 31-43. 16 refs. In Russian.

Observations of higher nervous activity, EEG, EKG, gas exchange, respiratory function, urine, and blood pressure, oxygen content, and morphological state of individuals confined for 30 days and longer in a pressure chamber. V. Z.

A66-29445 #

REACTION OF A HUMAN ORGANISM TO LANDING IMPACT OVERLOAD ACTING IN VARIOUS DIRECTIONS [REAKTSIIA ORGANIZMA CHELOVEKA NA DEISTVIE PEREGRUZOK PRIZEMLENIIA, DEISTVUIUSHCHIKH V RAZLICHNYKH NAPRAVLENIYAKH].

G. P. Mirolubov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 44-53. 27 refs. In Russian.

Study of the effect of landing impact overload on the human organism, conducted in an experimental ground stand with a reinforced mockup cockpit and a mechanical or pneumatic damper. The experimental technique is described and the results are given of observations of the EKG, kinetocardiogram, blood pressure, and respiration of nine individuals. V. Z.

A66-29446 #

PROBLEM OF PECULIARITIES IN THE FUNCTION AND INTERACTION OF THE OTOLITH AND CUPULA SYSTEMS OF THE HUMAN VESTIBULAR ANALYZER UNDER CHANGED GRAVITY CONDITIONS [K PROBLEME OSOBNOSTEI FUNKTSII I VZAIMODEISTVIA OTOLITOVOGO I KUPULIARNOGO APPARATOV VESTIBULIARNOGO ANALIZATORA CHELOVEKA V USLOVIYAKH IZMENENNOI VESOMOSTI].

E. M. Iuganov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 54-69. 22 refs. In Russian.

Consideration of the behavior of human otolith and cupula systems under anomalous gravity conditions of spaceflight as one of

the problems of extraterrestrial physiology. The duration of the post-rotational nystagmus, of counterrotation illusion, of the latent stage of swinging illusion, and of the threshold time of straightening of the body are investigated in male individuals. V. Z.

A66-29447 #

PROBLEM OF THE RESISTANCE OF MAN TO THE EFFECT OF INTENSIVE SHORT-TERM ANGULAR ACCELERATIONS [K VOPROSU OB USTOICHIVOSTI CHELOVEKA K VOZDEISTVIU KRATKOVREMENNYKH UGLOVYKH USKORENIY BOL'SHIKH VELICHIN].

V. M. Tardov, B. V. Ustiushin, and S. F. Orlov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 70-74. In Russian.

Investigation of the effect of abrupt angular accelerations of ± 30 to 90 sec^{-2} on the general condition, reactions of the vestibular analyzer, cardio-vascular, respiratory, and nervous systems, blood pressure, EKG, EEG, and electronystagmogram of six healthy male individuals 22 to 25 years of age. The results are discussed. V. Z.

A66-29448 #

CHANGES IN SOME PHYSIOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF MAN AFTER EXPOSURE TO LOW CARBON MONOXIDE CONCENTRATIONS [IZMENENIE NEKOTORYKH FIZIOLOGICHESKIKH I BIOKHIMICHESKIKH POKAZATELEY U CHELOVEKA POSLE VOZDEISTVIA OKISI UGLERODA V MALYKH KONTSENTRATSIIYAKH].

V. V. Kustov, V. I. Mikhailov, Z. I. Pilipiuk, Iu. N. Tokarev, V. S. Georgievskii, B. S. Katkovskii, and A. N. Kalinina.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 75-79. 10 refs. In Russian.

Investigation of the effect of inhalation for 8 hr of carbon monoxide concentrations of 0.011 to 0.012 mg/liter on healthy non-smoking men 21 to 24 years of age. Changes in the respiratory activity, catalase and cholinesterase activity rates, carboxyhemoglobin content in the blood, EKG, blood pressure, and mental efficiency are discussed. V. Z.

A66-29449 #

EFFECT OF ACCLIMATIZATION TO HIGH-MOUNTAIN CONDITIONS ON HUMAN RESISTANCE TO HYPOXIA [VLIANIE AKKLIMATIZATSII V VYSOKOGORNYYKH USLOVIYAKH NA USTOICHIVOST' CHELOVEKA K GIPOKSII].

E. N. Salatsinskaia.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 80-86. 9 refs. In Russian.

Results of observations at 1650 m above sea level of the resistance to hypoxia of 38 individuals trained for high-altitude climbing. A special air-filled apparatus with a soda lime absorber of CO_2 is used in respiration studies without admission of ambient air. The time of respiration sustained in the apparatus is used as the basic criterion of resistance to hypoxia. Changed handwriting, cyanosis, and tremor were the symptoms calling for an end of the experiment. V. Z.

A66-29450 #

STUDY OF THE TRANSMITTING CAPABILITY OF THE HUMAN VISUAL SYSTEM [ISSLEDOVANIE PROPUSKNOI SPOSOBNOSTI ZRITEL'NOI SISTEMY CHELOVEKA].

A. A. Nevskaia.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 87-101. 7 refs. In Russian.

Results from investigations of the amount of visual information a human can receive and process during a given length of time. The rate of transmission and processing of information connected with discerning the shape of an object is determined. R. A. F.

A66-29451 #

PARTICULAR FEATURES OF AUDITORY RESPONSE UNDER CONDITIONS OF INTERMITTENT LONG-TERM ACTION OF MEDIUM-INTENSITY SOUND ON A HUMAN [OSOBENNOSTI SLUKHOVOI CHUVSTVITEL'NOSTI V USLOVIYAKH NEPRERYVNOGO I DLI-TEL'NOGO DEISTVIA NA CHELOVEKA SHUMA SREDNEI INTENSIVNOSTI].

Iu. V. Krylov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 102-106. 25 refs. In Russian.

Generalized results from studies of the auditory sensitivity of eight experimental subjects, conducted discontinuously in a hermetic chamber of small volume over periods of from 27 to 60 days. The subjects were intermittently exposed to sound of intensity from 60 to 65 db at frequencies of 800 to 1800 cps, with the intensity decreasing by 4 to 5 db/octave on the high-frequency side. The auditory-response curves of the subjects are plotted and discussed.

R. A. F.

A66-29452 #

SOME DATA ON A GROUP OF ANIMALS IN A CLOSED ECOLOGICAL SYSTEM [NEKOTORYE DANNYE PO ZVENU ZHIVOTNYKH V ZAMKNUTOI EKOLOGICHESKOI SISTEME].

I. A. Abakumova, K. S. Akhlebninskii, V. P. Bychkov, N. G. Demochkina, Iu. I. Kondrat'ev, and A. S. Ushakov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 107-118. 15 refs. In Russian.

Physiological data on ducks and chickens observed in closed ecological systems. Daily oxygen and feed requirements per bird and daily carbon dioxide output per bird are tabulated.

R. A. F.

A66-29453 #

POSSIBILITIES FOR PHARMACOCHEMICAL PROTECTION FROM RADIATION INJURIES DURING SPACE FLIGHTS [PERSPEKTIVY FARMAKOKHIMICHESKOI ZASHCHITY OT RADIATSIONNYKH PORAZHENii PRI KOSMICHESKIKH POLETAKH].

P. P. Saksonov, V. V. Antipov, N. N. Dobrov, V. S. Shashkov, V. A. Kozlov, V. S. Parshin, B. I. Davydov, B. L. Razgovorov, V. S. Morozov, and M. D. Nikitin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 119-126. 68 refs. In Russian.

Survey of the results from work done toward the development of a pharmacochemical preparation which will protect the crew and entire biocomplex of a spacecraft from radiation injury. It is concluded that the problem is an extremely urgent and complex one which has not been worked on enough.

R. A. F.

A66-29454 #

BIOLOGICAL ESTIMATE OF RADIATION CONDITIONS ON THE EARTH-MOON TRAJECTORY [BIOLOGICHESKAIA OTSENKA RADIATSIONNYKH USLOVii NA TRASSE ZEMLIA-LUNA].

Iu. M. Volynkin, V. V. Antipov, V. A. Guda, M. D. Nikitin, and P. P. Saksonov.

(Mezhdunarodnyi Astronavticheskii Kongress, 15th, Warsaw, Poland, Oct. 7-12, 1964.)

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 127-138. 41 refs. In Russian.

Analysis of the radiation environment in near-earth space. An estimate is made of the danger to a human from ionizing radiation encountered during a spaceflight from the earth to the moon.

R. A. F.

A66-29455 #

ANTIRADIATION PROTECTION IN CONNECTION WITH THE PROBLEM OF THE RELATIVE BIOLOGICAL EFFECTIVENESS OF SELDOM-IONIZING RADIATION [PROTIVOLUCHEVAIA ZASHCHITA V SVIAZI S PROBLEMOI OTNOSITEL'NOI BIOLOGICHESKOI EFFEKTIVNOSTI REDKOIONIZIRUIUSHCHIKH IZLUCHENii].

S. P. Iarmonenko and A. G. Konopliannikov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 139-164. 124 refs. In Russian.

Compendium of experimental data on the relative biological effectiveness (RBE) of radiation relative to its linear-energy-loss (LLE) characteristics. Data on the degree of protection against LLE radiation given by various pharmacochemical preparations is also summarized. RBE data are tabulated for both hard electromagnetic radiation and high-energy particles.

R. A. F.

A66-29456 #

NEW ASPECTS OF PERSONAL HYGIENE [NOVYE ASPEKTY LICHNOI GIGIENY].

V. V. Levashov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 165-168. In Russian.

Survey of some of the personal-hygiene aspects of spaceflight. The conditions of spaceflight make the development of techniques for applying means of personal hygiene, from cleaning the skin to preserving its biological constant, a unique problem.

R. A. F.

A66-29457 #

SOME PROBLEMS OF HUMAN ECOLOGY UNDER THE CONDITIONS OF CLOSED SYSTEMS OF CYCLING SUBSTANCES [NEKOTORYE PROBLEMY EKOLOGII CHELOVEKA V USLOVIYAKH ZAMKNUTYKH SISTEM KRUGOVOROTA VESHCHESTV].

E. Ia. Shepelev.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 169-179. 24 refs. In Russian.

Analysis of physiological and hygienic problems which may arise when a human is included in a closed system of circulating biological substances. The material connections of a human in such a system are seen to be extraordinarily complex. It is pointed out that the traditional approaches of physiology, hygiene, toxicology, etc., are inadequate for a solution to this problem.

R. A. F.

A66-29458 #

HYGIENIC INVESTIGATIONS OF THE CLOTHES FOR ASTRONAUTS TO WEAR IN A SMALL-VOLUME CABIN DURING COMFORTABLE MICROCLIMATIC CONDITIONS [GIGIENICHESKIE ISSLEDOVANIA ODEZHDI KOSMONAVTOV DLIA NOSHENIIA V KABINE MALOGO OB'EMA PRI KOMFORTNYKH MIKROKLIMATICHESKIKH USLOVIAKH].

I. G. Popov, V. I. Krichagin, V. V. Borshchenko, and F. K. Savinich.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 180-187. In Russian.

Results from a series of experiments to determine the best type of clothing for cosmonauts. The effect of the fabric pattern, the air-permeability, and the moisture-absorbing characteristics of clothing on the microclimate in the space between the body and clothing are discussed. These and other experiments indicate that a sport-type knit suit is best at comfortable temperatures.

R. A. F.

A66-29459 #

THEORETICAL BASIS OF THE MICROATMOSPHERE IN THE CABINS OF PLANETARY SPACECRAFT AND THE POSSIBILITIES OF USING HELIUM-OXYGEN MIXTURES FOR THESE PURPOSES [TEORETICHESKOE OBOSNOVANIE MIKROATMOSFERY KABIN PLANETARNYKH KOSMICHESKIKH KORABLEI I PERSPEKTIVY ISPOL'ZOVANIA DLIA ETIKH TSELEI GELIOKISLORODNYKH SMESEI].

B. M. Savin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 188-195. 13 refs. In Russian.

Survey of the question of spacecraft-cabin atmospheric composition. Three sets of requirements are established for spacecraft atmosphere - those of a physiological and hygienic nature, those arising from the necessity to protect the crew and minimize lock time before exit, and those deriving from technical considerations. Helium-oxygen atmospheres are examined in the light of these criteria.

R. A. F.

A66-29460 #

CYBERNETICS AND SPACE BIOLOGY [KIBERNETIKA I KOSMICHESKAIA BIOLOGIIA].

N. A. Chekhonadskii.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 196-205. 19 refs. In Russian.

Survey of some methods of applying biological cybernetics to physiological studies during space flight. The techniques of mathematical modeling, biological control, and statistical dynamics are outlined, and simple examples are given for their application to space biology and medicine.

R. A. F.

A66-29461 #

APPLICATION OF SOME CONCEPTS OF INFORMATION THEORY TO THE ANALYSIS OF PHYSIOLOGICAL DATA OBTAINED DURING SPACE FLIGHTS [PRILozHENIE NEKOTORYKH PONIATII TEORII INFORMATSII DLI ANALIZA FIZIOLOGICHESKIKH DANNYKH, POLUCHAEMYKH VO VREMIA KOSMICHESKIKH POLETOV].

A. D. Egorov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 206-216. 7 refs. In Russian.

Theoretical considerations concerning the application of the concept of entropy, which is the basis of the information theory, to the analysis of physiological data of space flights. It is suggested that the physiological entropy be determined, along with other statistical parameters, in the analysis of the performance of various systems of the organism during space flights. The entropy of heart-contraction frequency of Titov is discussed as an example.

V. Z.

A66-29462 #

POSSIBILITY OF THE USE OF ELECTRONIC LOGIC CIRCUITS IN AUTOMATIC MEDICAL TESTS [O VOZMOZHNOСТИ PRIMENENIYA ELEKTRONNYKH LOGICHESKIKH SKHEM DLI AVTOMATICHESKOGO VRACHEBNOGO KONTROLIA].

V. Ia. Kostikova, R. M. Baevskii, A. P. Kalinovskii, and B. A. Soshin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 217-226. In Russian.

Discussion of automatic on-board systems designed to solve logical diagnostic problems with algorithms given in matrix form. Pulse and breathing rates, the temperature of the body and air, the state of consciousness, the level of motor activity, the skin permittivity, and oxygen and carbon dioxide content of the air are considered as the parameters to be continuously measured and monitored at the ground control center. A number of such systems are considered, showing their basic circuits and block diagrams.

V. Z.

A66-29463 #

SOME PHYSIOLOGICAL RESULTS IN THE ASSESSMENT OF THE CONDITION AND EFFICIENCY OF SPACEMEN DURING AN ORBITAL FLIGHT [NEKOTORYE FIZIOLOGICHESKIE DANNYE PO OTSENKE SOSTOYANIYA I RABOTOSPOSOBNOSTI KOSMONAVTOV V USLOVIYAKH ORBITAL'NOGO POLETA].

A. D. Voskresenskii, O. G. Gazenko, G. V. Izosimov, V. I. Kopanev, D. G. Maksimov, and V. I. Iazdovskii.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 227-236. 15 refs. In Russian.

Consideration of the importance of observations of higher nervous activity as an objective criterion that should be added to recorded technical results of a flight in the assessment of the behavior and performance of men in space. Electroencephalograms, electrooculograms and the cutaneogalvanic reactions of Nikolaev, Popovich, Bykovskii, and Tereshkova are discussed.

V. Z.

A66-29464 #

SOME RESULTS OF BIOLOGICAL AND MEDICAL STUDIES CONDUCTED DURING THE TRAINING AND FLIGHTS OF COSMONAUTS V. F. BYKOVSKII AND V. V. TERESHKOVA [NEKOTORYE REZULTATY MEDIKO-BIOLOGICHESKIKH ISSLEDOVANI, PROVEDENNYKH PRI PODGOTOVKE I POLETAKH KOSMONAVTOV V. F. BYKOVSKOGO I V. V. TERESHKOVOI].

V. I. Iazdovskii, M. D. Emel'ianov, P. V. Vasil'ev, and V. I. Kopanev.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 237-247. In Russian.

Discussion of the results of various biological and medical tests made during the training and orbital flights of Bykovskii and Tereshkova. No pathological changes were observed during or after the flights; a general conclusion is made that space flights of 5 days for men and 3 days for women are well realizable after thorough selection and adequate training of candidates.

V. Z.

A66-29465 #

RESULTS OF BIOLOGICAL EXPERIMENTS CONDUCTED UNDER FLIGHT CONDITIONS IN THE VOSTOK SPACECRAFT WITH THE PARTICIPATION OF SPACEMEN A. G. NIKOLAEV, P. R. POPOVICH, AND V. F. BYKOVSKII [REZULTATY BIOLOGICHESKIKH EKSPERIMENTOV, PROVEDENNYKH V USLOVIYAKH POLETA NA KORABLIK "VOSTOK" S UCHASTIEM KOSMONAVTOV A. G. NIKOLAEVA, P. R. POPOVICH I V. F. BYKOVSKOGO].

V. V. Antipov, N. L. Delone, G. P. Parfenov, and V. G. Vysotskii.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 248-260. 6 refs. In Russian.

Discussion of the results of a study of reproduction of *Drosophila melanogaster* species in the state of weightlessness and of the effect of weightlessness and cosmic radiation on the hereditary structures of *Tradescantia paludosa*, conducted aboard the Vostok 3 and 4 spacecraft. The results are considered to be of a tentative nature, marking the beginning of future extensive experiments.

V. Z.

A66-29466 #

RESULTS OF MICROBIOLOGICAL AND CYTOLOGICAL EXPERIMENTS IN THE VOSTOK SPACECRAFT [ITOGI MIKROBIOLOGICHESKIKH I TSITOLOGICHESKIKH ISSLEDOVANI NA KOSMICHESKIKH KORABLIK "VOSTOK"].

N. N. Zhukov-Verezhnikov, N. I. Rybakov, V. A. Kozlov, P. P. Saksonov, N. N. Dobrov, V. V. Antipov, I. I. Podoplelov, and G. P. Parfenov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 261-269. 11 refs. In Russian.

Discussion of the results of observations of the behavior of lysogenic *E. coli* K-12 (λ) culture and normal and cancerous human cells during Vostok 3, 4, 5, and 6 orbital flights. Stimulated phage-producing activity of this *coli* culture during orbital flights is noted among other less indicative and conclusive observations.

V. Z.

A66-29467 #

REACTIONS OF SPACEMEN UNDER WEIGHTLESS CONDITIONS [REAKTSII KOSMONAVTOV V USLOVIAKH NEVESOMOSTI].

I. I. Kas'ian, V. I. Kopanev, and V. I. Izdovskii.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 270-289. 45 refs. In Russian.

Analysis of the physiological reactions of spacemen Gagarin, Titov, Nikolaev, Popovich, and Bykovskii under conditions of brief and prolonged weightlessness during training flights in aircraft along a Keplerian parabola and during Vostok orbital flights. Motor activity, dynamometric characteristics of wrists, pulse beat and breathing rates, and arterial pressure of the spacemen are discussed.

V. Z.

A66-29468 #

CONDITION OF SOME FACTORS OF NATURAL IMMUNITY AND AUTOFLORA OF SPACEMEN DURING TRAINING AND AFTER VOSTOK 1, 2, 3, AND 4 FLIGHTS [SOSTOIANIE NEKOTORYKH FAKTOROV ESTESTVENNOGO IMMUNITETA I AUTOFLORY KOSMONAVTOV V PERIOD PODGOTOVK I POSLE POLETA NA KOSMICHESKIKH KORABLIKH "VOSTOK", "VOSTOK-2", "VOSTOK-3" I "VOSTOK-4"].

O. G. Alekseeva.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 290-303. 5 refs. In Russian.

Discussion of the results of immunological reactivity studies on spacemen Gagarin, Titov, Nikolaev, and Popovich. The saliva lysozyme content, the bactericidal property of the skin and blood plasma, and the digestive capacity of blood neutrophils were determined as criteria of the bactericidal capacity of the organism. The phagocytic function, the cytogram of the oral-cavity mucus membrane, and the composition and hemolytic property of the pharynx and forearm epidermis flora were also studied. Immunological changes observed were temporary and insignificant in terms of antimicrobial immunity.

V. Z.

A66-29469 #

USE OF HIGHER PLANTS AS INDICATORS IN THE STUDY OF THE EFFECT ON THE LIVING CELL OF CONDITIONS OF SPACECRAFT SATELLITE FLIGHTS [O PRIMENENII VYSSHIKH RASTENII V KACHESTVE INDIKATOROV PRI IZUCHENII DEISTVIA NA ZHIVUIU KLETKU FAKTOROV POLETA NA KORABLIKH-SPUTNIKAKH].

N. L. Delone.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 304-307. 7 refs. In Russian.

Consideration of *Tradescantia paludosa*, *Allium cepa*, *Vicia faba*, *Pinus silvestris*, *Triticum durum*, *Triticum vulgare*, *Lactuca sativa*, *Sinapis alba*, *Zea mais*, *Cucumis sativa*, *Licopersicon esculentum*, *Daucus carota*, *Haploppapus gracilis*, and *Trillium vulgare* in the search for suitable plants to be used as biological dosimeters of the effects of spaceflight on the living cell. Cytological characteristics of these plants are discussed.

V. Z.

A66-29470 #

EFFECT OF A PARTIAL RESTRAINT OF MOTOR ACTIVITY ON THE BASIC PHYSIOLOGICAL PROCESSES IN MONKEYS [VLIANIE CHASTICHNOGO OGRANICHENIA DVIGATEL'NOI AKTIVNOSTI NA OSNOVNYE FIZIOLOGICHESKIE PROTSESSY U OBEZ'IAN].

I. D. Bogina, N. A. Rokotova, E. S. Rogovenko, and R. L. Sheikin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 308-315. 7 refs. In Russian.

Results of 4-month diurnal observations of the physiological functions of capuchin and macaca monkeys under conditions of restricted mobility. Appetite, orientation reflexes, cardiorespiratory activity, electrocardiography, and bioelectrical activity of the brain of monkeys fixed in a fastening device, are discussed.

V. Z.

A66-29471 #

EFFECT OF PROLONGED OPTOKINETIC STIMULI ON AN ORGANISM [O DEISTVII DLITEL'NYKH OPNOKINETICHESKIKH RAZDRAZHENII NA ORGANIZM].

V. P. Neverov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 316-321. 20 refs. In Russian.

Experimental determination of the effect of prolonged optokinetic stimulation on rabbits. A study is made of optokinetic nystagmus (railroad nystagmus) in rabbits, using a method based on the recording of changes in the corneoretinal potential during movement of the eyeball. A new phenomenon - reversible postoptokinetic nystagmus - is observed, with a fast phase traveling in a direction opposite to that of the fast phase of optokinetic nystagmus. This new phenomenon is attributed to prolonged circulation of the excitation of the investigated nervous structures in the absence of the exogenic optokinetic stimulus.

A. B. K.

A66-29472 #

EFFECT OF TRANSVERSELY DIRECTED G-FORCES ON THE ORGANISMS OF FEMALE MONKEYS [O VLIANII POPERECHNONAPRAVLENNYKH PEREGRUZOK NA ORGANIZM OBEZ'IAN-SAMOK].

A. R. Kotovskaia, P. V. Vasil'ev, B. A. Lapin, S. F. Simpura, V. A. Shakhlamov, and N. S. Artem'eva.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 322-332. 8 refs. In Russian.

Study of the effect of transverse g-forces on the sexual apparatus, cardiovascular system, and respiratory organs of female monkeys. The changes in the heart-contraction and respiration rates of monkeys subjected to rotation in a centrifuge are observed. A histological and histochemical study is made of the ovaries of monkeys subjected to g-forces at various stages of the menstrual cycle. It is found that g-forces have the greatest traumatic effect during the ovulation phase of the menstrual cycle and that morphological changes are most pronounced on the third day after rotation.

A. B. K.

A66-29473 #

EFFECT OF PROLONGED HYPOKINESIA ON HUMAN RESISTANCE TO G-FORCES [VLIANIE DLITEL'NOI GIPOKINEZII NA USTOICHIVOST' CHELOVEKA K PEREGRUZKAM].

A. R. Kotovskaia, L. I. Kakurin, N. I. Konnova, S. F. Simpura, and I. S. Grishina.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 333-342. 10 refs. In Russian.

Study of the effect of prolonged hypokinesia on human resistance to transverse g-forces. A detailed study is made of the changes in the respiratory and circulatory systems, motor response, and acuteness of vision of healthy adult males subjected to 3- and 20-day periods of enforced bed rest and then to the action of 7 g's applied from chest to back. Individual differences in the reactions to 20 days of hypokinesia are noted; the resistance of two subjects to g-forces sharply decreased, while the resistance of a third remained unchanged.

A. B. K.

A66-29474 #

EFFECT OF SMALL CORIOLIS ACCELERATIONS ON THE FUNCTIONAL STATE OF THE HUMAN HEART [VLIANIE MALYKH VELICHIN USKORENII KORJOLISA NA FUNKTSIONAL'NOE SOSTOIANIE SERDTSA CHELOVEKA].

R. A. Vartbaronov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 343-348. 18 refs. In Russian.

Analysis of the results of studies of the activity of the human heart under conditions of prolonged action of small Coriolis accelerations. An attempt is made to ascertain the extent to which protracted Coriolis accelerations of various intensities affect the functional state of the human heart and those indexes of cardiac activity which can be used as an objective criterion of vestibulovegetative disturbances. A. B. K.

A66-29475

EFFECT OF CHEST-TO-BACK ACCELERATIONS ON HUMAN ELECTROENCEPHALGRAMS AND WORKING CAPACITY [KHARAKTER ELEKTROENTSEFALOGRAMMY I RABOTOSPOBOST' CHELOVEKA PRI DEISTVII USKORENIY, NAPRAVLENNYKH PO OSI "SPINA-GRUD'"].

A. S. Barer and V. B. Zubavin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 349-360. 16 refs. In Russian.

Study of changes in the electroencephalograms and working capacity of humans subjected to chest-to-back accelerations. The results of three series of tests with accelerations of various intensities acting at various angles (65, 78, and 90°) to the horizontal axis of the human body are cited. In the case of accelerations acting at an angle of 65° to the horizontal axis, a distinction is made between the effects of accelerations of 6 and 8 g, on the one hand, and accelerations of 12 g or more, on the other, since at this angle head-to-pelvis acceleration components are involved. A. B. K.

A66-29476

EFFECT OF ROTATIONS ON THE HUMAN ORGANISM AT VARIOUS ANGLES OF INCLINATION OF THE TORSO [VLIYANIE VRASHCHENIY NA ORGANIZM CHELOVEKA PRI RAZLICHNYKH UGLAKH NAKLONA TULOVISHCHA].

A. R. Mansurov and S. S. Markarian.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 361-366. 10 refs. In Russian.

Determination of the effect of rotations on the functional state of the cardiovascular and respiratory systems of humans subjected to the action of various angular accelerations at various angles of inclination of the torso. Using the X-ray kymograph, linear and planimetric measurements of the dimensions of the heart and vascular bundle before and after testing were obtained. A. B. K.

A66-29477

THE NATURE OF THE BIOLOGICAL ACTION OF VIBRATION [K PRIRODE BIOLOGICHESKOGO DEISTVIA VIBRATSII].

S. N. Romanov, R. A. Romanova, and Z. I. Monastyrshina.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 367-372. 13 refs. In Russian.

Results of experiments carried out for the purpose of determining the effect of vibration on the receptivity of certain organs and tissues of white mice to a dye introduced intravenously. It is found from in situ tests that all cells are capable to one extent or another of perceiving and correspondingly reacting to vibration. It is confirmed by in vitro tests that the cells of various tissues are sensitive to differing degrees to the action of vibration. It is concluded that, regardless of whether a special receptor is present or absent in the organism, all cells perceive the stimulus of vibration and react to it in a nonspecific manner. A. B. K.

A66-29478

EFFECT OF THE COMBINED ACTION OF ACCELERATIONS, VIBRATION, AND RADIATION ON THE NUCLEI OF BONE-MARROW CELLS IN MICE [VLIYANIE KOMBINIROVANNOGO DEISTVIA USKORENIY, VIBRATSII I RADIATSII NA IADRA KLETOK KOSTNOGO MOZGA MYSHEI].

M. A. Arsen'eva, L. A. Beliaeva, and A. V. Golovkina.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 373-390. 15 refs. In Russian.

Analysis of the effect of accelerations of various magnitudes and durations and of the effect of the combined action of centrifugation plus vibration and radiation on the nuclei of bone-marrow cells in mice. It is found that the main effect of accelerations of various magnitudes and durations on the nuclei under study is a reduction in the mytological activity of these nuclei at 20 g, adhesion of the chromosomes, and a certain increase in the frequency of the chromosome rearrangements. Detailed studies are also made of the combined effect of accelerations and radiation on these nuclei and of the remote consequences of the combined action of vibration, acceleration, and a 350-r dose of radiation on the length of the cell cycle, the synthesis of DNA, and the nature of the chromosome rearrangements. A. B. K.

A66-29479

ADAPTATION REARRANGEMENTS IN THE ORGANISMS OF MICE DURING AND AFTER EXPOSURE TO HIGH CONCENTRATIONS OF CARBON DIOXIDE [ADAPTATSIONNYE PERESTROIKI V ORGANIZME MYSHEI VO VREMIA I POSLE DEISTVIA POVYSHENNYKH KONTSENTRATSII DVOUKISI UGLERODA].

A. I. Koreshkin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 391-400. 18 refs. In Russian.

Study of the ability of white mice to adapt to high concentrations of CO₂. A comparative study is made of the functional changes occurring in mice subjected to a 70% concentration of CO₂ after having been exposed for various lengths of time to a 7.5% concentration of CO₂, and in control mice subjected to the lethal concentration without previous exposure to the 7.5% concentration. It is found that while mice subjected for two days to 7.5% CO₂ showed greater resistance to CO₂ than the control mice when exposed to the 70% concentration (up to 48 hr after exposure to the lower concentration), the difference between the two groups decreased steadily as the time following exposure of the first group to 7.5% CO₂ increased. A. B. K.

A66-29480

INJURIOUS EFFECT OF 660- AND 120-MEV PROTONS AND THE EFFECTIVENESS OF PHARMACOCHEMICAL PROTECTION [PORAZHAUSHCHEE DEISTVIE PROTONOV S ENERGIEI 660 I 120 MEV I EFFEKTIVNOST' FARMAKOKHIMICHESKOI ZASHCHITY].

V. S. Shashkov and V. S. Morozov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 401-410. 40 refs. In Russian.

Study of the effect of γ radiation and 660- and 120-Mev protons on white mice and of the protective action of certain preparations in the presence of X and γ radiation. Data concerning the radiobiological effectiveness of various doses of 660-Mev protons in comparison with cobalt-60 γ rays are cited. It is found that AET (aminoethylisothiourea) and 5-methoxytryptamine, in comparison with a number of other preparations, give the most effective protective action against both γ radiation and irradiation by 660-Mev protons. A. B. K.

A66-29481

EFFECT OF SHIELDING INDIVIDUAL PARTS OF THE BODY OF AN ANIMAL ON VARIATIONS IN THE REACTION TO RADIATION DURING EXPOSURE TO GAMMA RAYS AND HIGH-ENERGY PROTONS [VLIYANIE EKRANIROVANIYA OTDEL'NYKH OBLASTEI TELA ZHIVOTNYKH NA IZMENENIE LUCHEVOI REAKTSII PRI VOZDEISTVII GAMMA-LUCHEI I PROTONOV VYSOKIKH ENERGII].

B. L. Razgovorov, V. S. Morozov, V. S. Shashkov, V. V. Antipov, N. N. Dobrov, N. I. Konnova, T. S. L'vova, and P. P. Saksonov.
IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].
Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 411-429. 21 refs. In Russian.
Study of radiation effects in rats partially exposed to radiation by gamma rays and 120-Mev protons. The radiation reaction of rats partially shielded with steel plates is investigated. Partial shielding, especially of abdominal sections, is found to substantially alleviate the symptoms of radiation sickness.

V. Z.

A66-29482 #

MORPHOLOGICAL CHANGES IN THE HEMOPOIETIC ORGANS OF MICE AFTER IRRADIATION WITH HIGH ENERGY PROTONS [MORFOLOGICHESKIE IZMENENIYA V KROVOTVORNYKH ORGANAKH MYSHEI POSLE OBLUCHENIYA PROTONAMI VYSOKIKH ENERGII].

N. A. Gaidamakin, V. G. Petrukhin, V. S. Shashkov, V. V. Antipov, and P. P. Saksonov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 430-436. 17 refs. In Russian.

Study of the pathomorphological changes of the hemopoietic organs of 90 individual mice irradiated with various doses of high energy protons. Changes observed in the spleen, thymus, and marrow are discussed. The experimental technique is described in detail.

V. Z.

A66-29483 #

RESISTANCE TO ACUTE OXYGEN DEFICIENCY OF RATS WITH RADIATION SICKNESS [USTOICHIVOST' K RYS K OSTROI KISLO-RODNOI NEDOSTATOCHNOSTI PRI LUCHEVOI BOLEZNI].

S. V. Gasteva, K. P. Ivanov, and D. A. Chetverikov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 437-444. 16 refs. In Russian.

Study of the resistance to oxygen deficiency of 178 Wistar rats after exposure to X-ray doses of 750 roentgens. Survival time of 50% of the rats at 140 torr was taken as the criterion of resistance. Reduced susceptibility to hypoxia was found to persist until the radiation sickness reached its terminal stage.

V. Z.

A66-29484 #

NEW TRENDS IN THE STUDY OF CHEMICAL PROTECTION FROM GENETIC CHANGES [NOVYE PUTI IZUCHENIYA KHIMICHESKOI ZASHCHITY OT GENETICHESKIKH IZMENENII].

N. N. Zhukov-Verezhnikov, M. N. Volkov, N. I. Rybakov, P. P. Saksonov, V. A. Kozlov, P. A. Konstantinov, V. V. Antipov, N. N. Dobrov, and E. D. Aniskin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 445-450. 16 refs. In Russian.

Investigation of the inhibiting effect of some aminothiol compounds and pyrimidine bases on the phagogenic activity of E-coli K-12(λ) bacteria exposed to X-ray doses of 15,000 roentgens.

V. Z.

A66-29485 #

VALUE OF THE PROCESS OF POST-RADIATION RESTITUTION OF GENETIC STRUCTURES FOR THE RADIOSENSITIVITY OF CELLS. I - QUANTITATIVE REGULARITIES IN POST-RADIATION RESTITUTION OF YEAST CELLS [O ZNACHENII PROTSESSA POSTRADIATSIONNOGO VOSSTANOVLENIIA GENETICHESKIKH STRUKTUR DLIYA RADIOCHUVSTVITEL'NOSTI KLETOK. I - KOLICHESTVENNYE ZAKONOMERNOSTI POSTRADIATSIONNOGO VOSSTANOVLENIIA DROZHZHEVYKH KLETOK].

V. S. Barsukov, O. V. Malinovskii, and N. M. Mitushova.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 451-460. 13 refs. In Russian.

Study of the restitutive capacity of tetraploid *Saccharomyces cerevisiae* cell suspensions in wort-agar media and in water after exposure to ionizing radiation of 1300 rad/min. It is found that dominant-detail types of genetic damages caused by radiation are highly reversible, being restored in individual cells with the participation of mass cytoplasmic structures.

V. Z.

A66-29486 #

IMPORTANCE OF THE PROCESS OF POSTRADIATION RESTITUTION OF GENETIC STRUCTURES FOR THE RADIOSENSITIVITY OF CELLS. II - RADIOSENSITIVITY OF YEAST CELLS WITH VARIOUS DEGREES OF CHROMOSOME REPLICATION [O ZNACHENII PROTSESSA POSTRADIATSIONNOGO VOSSTANOVLENIIA GENETICHESKIKH STRUKTUR DLIYA RADIOCHUVSTVITEL'NOSTI KLETOK. II - RADIOCHUVSTVITEL'NOST' DROZHZHEVYKH KLETOK RAZNOI PLOIDNOSTI].

V. S. Barsukov, O. V. Malinovskii, and N. M. Mitushova.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 461-468. 11 refs. In Russian.

Attempt to explain the differences in the radiosensitivity of yeast cell in terms of the differences in the intensity of the genetic-structure-restitution process. The possibility of estimating the proportions of undamaged and restored cells in a population of irradiation survivors is investigated.

R. A. F.

A66-29487 #

ELIMINATING THE INJURIOUS EFFECTS OF β RADIATION ON THE SEEDS OF CULTIVATED PLANTS WITH THE AID OF PHYSIOLOGICALLY ACTIVE COMPOUNDS [SNIATIE VREDNOGO DEISTVIA β-IZLUCHENIYA NA SEMENA KUL'TURNYKH RASTENII PRI POMOSHCHI FIZIOLOGICHESKI AKTIVNYKH SOEDINENII].

Iu. I. Shaidarov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 469-473. 9 refs. In Russian.

Results from experiments concerned with the use of chemical preparations and cultured antibiotic fluids to preserve seeds from the ill effects of β-particle irradiation. The chemical preparations were N₁-(pyridyl-(2)) N₄-(2"-oxy-1"), 4"-naphthoquinone-(4)) sulfanilamide; 4, 4-di-trichloroacetyl-diamino-diphenyl sulfone; and 2-ketononanoic acid. Corn, lupine, and summer-wheat seeds were investigated and the results are tabulated. It is found that the deleterious aftereffects of ionizing radiation were eliminated, even in the second generation.

R. A. F.

A66-29488 #

ULTRAVIOLET IRRADIATION OF PLANTS AS A PROBLEM IN SPACE PHYTOPHYSIOLOGY [UL'TRAIOLETOVOE OBLUCHENIE RASTENII KAK PROBLEMA KOSMICHESKOI FITOFIZIOLOGII].

A. A. Shakhov, S. V. Shishchenko, S. A. Stanko, V. S. Shaidurov, and B. M. Golubkova.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 474-486. 22 refs. In Russian.

Study of the effect of UV radiation on the photosynthesis mechanism of plants, as it applies to the space physiology of plants. Studies of plants growing at an altitude of 3680 m indicate that the increased radiation level has little effect on photosynthesis in the majority of them and actually stimulates the activity in some types.

R. A. F.

A66-29489 #

ACTIVE CHOICE BY ANIMALS OF GASEOUS MEDIA WITH VARIOUS OXYGEN CONTENTS UNDER NORMAL CONDITIONS AND AFTER SUBJECTION TO A HYPEROXIA-INDUCING ATMOSPHERE [OB AKTIVNOM VYBORE ZHIVOTNYMI GAZOVYKH SRED S RAZLICHNYM SODERZHANIEM KISLORODA V OBYCHNYKH USLOVIAKH I POSLE VOZDEISTVIA GIPEROKSICHESKOI ATMOSFERY].

I. S. Breslav.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 487-491. 14 refs. In Russian.

Study of the atmospheric preferences of mice confined for several days in atmospheres containing 60 and 90% oxygen. Comparison with control animals shows that the mice removed from the oxygen-rich atmospheres showed a preference for oxygen-poor atmospheres for several days after removal.

R. A. F.

A66-29490 #

EFFECT OF INCREASED PARTIAL OXYGEN PRESSURE ON THE MORPHOLOGICAL COMPOSITION OF THE PERIPHERAL BLOOD OF ANIMALS [K VLIANIU POVYSHENNOGO PARTSIAL'NOGO DAVLENIIA KISLORODA NA MORFOLOGICHESKII SOSTAV PERIFERICHESKOI KROVI ZHIVOTNYKH].

I. S. Breslav and A. M. Shmeleva.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 492-501. 25 refs. In Russian.

Investigation of the dynamics of the indices of morphological composition of the peripheral blood of animals kept for varying periods of time in an atmosphere with a raised oxygen partial pressure. Mice were exposed to mixtures containing 60 and 90% O₂ for 36-hr periods, to pure O₂ at 2.5 atm for 1.5-hr periods, and to 60% O₂ for periods of up to 10 days. Variations in the morphological composition of the red and white components of the rats' blood both during and after their exposure to the increased oxygen are plotted.

R. A. F.

A66-29491 #

PROBLEM OF VARIOUS FORMS OF HYPOXIA AND ADAPTATION TO THEM. I - EFFECTS OF GRADUALLY DEVELOPING AND SUDDEN HYPOXIA [K VOPROSU O RAZLICHNYKH FORMAKH GIPOKSII I ADAPTATSII K NIM. I - VLIANIE POSTEPENNO RAZVIVAIUSHCHEISIA I VNEZAPNOI GIPOKSII].

V. A. Konstantinov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 502-511. 22 refs. In Russian.

Experimental study of the effects on cats and rats of oxygen starvation conditions due to gradual and abrupt drop in the oxygen content of air. It is found that apart from inert compensation processes, the increased immunity of an organism to hypoxia may involve some as yet undetermined emergency mechanism of protection.

V. Z.

A66-29492 #

PROBLEM OF VARIOUS FORMS OF HYPOXIA AND ADAPTATION TO THEM. II - PECULIARITIES IN THE DEVELOPMENT OF EXTREMAL HYPOXIA [K VOPROSU O RAZLICHNYKH FORMAKH GIPOKSII I ADAPTATSII K NIM. II - OB OSOBNOSTIYAKH TECHENIIA EKSTREMAL'NOI GIPOKSII].

V. A. Konstantinov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 512-517. 10 refs. In Russian.

Results of observations of the symptoms of superacute hypoxia that develop in cats given pure nitrogen at normal pressure. The full development of the condition (followed by artificial respiration) took 4 min or less. It is believed that the duration of the condition is more dependent on the biological properties of hemoglobin and other oxygen transporting tissues than on compensatory reactions of the organism.

V. Z.

A66-29493 #

EFFECT OF PROLONGED EXPOSURE TO CONDITIONS OF AN OXYGEN-ENRICHED AIR MEDIUM ON SOME PHYSIOLOGICAL FUNCTIONS OF ANIMALS [VLIANIE DLITEL'NOGO PREBYVANIA ZHIVOTNYKH V USLOVIAKH VOZDUSHNOI SREDY, OBOGASHCHENNOI KISLORODOM, NA NEKOTORYE FIZIOLOGICHESKIE FUNKTSII].

A. G. Zhironkin, I. S. Breslav, E. A. Konza, A. D. Nozdrachev, E. N. Salatsinskaia, G. V. Troshikhin, L. D. Fedorova, and A. M. Shmeleva.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 518-530. 56 refs. In Russian.

Investigation of the effects on white mice of exposure of up to 10 days to an air medium with 63 vol% oxygen. The procedure and apparatus used for biological and physiological observations of the animals are described. The results of various routine and special tests are discussed.

V. Z.

A66-29494 #

AMMONIA AS A COMPONENT OF AIR MEDIA IN CLOSED PLACES [AMMIK KAK ODIN IZ KOMPONENTOV VOZDUSHNOI SREDY ZAKRYTYKH POMESHCHENII].

V. I. Mikhailov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 531-534. 14 refs. In Russian.

Investigation of the toxic and lethal effects on mice of ammonia in air. Various biological and physiological changes observed in test animals are discussed. The lethal ratio of NH₃ to air for 2 hr exposure is 4.51 mg/liter. It is believed that ammonia has a cumulative toxic effect.

V. Z.

A66-29495 #

PROBLEM OF THE EMETIC CENTER IRRITABILITY IN MOTION SICKNESS [K VOPROSU O SOSTOIANII VOZBUDIMOSTI RVOTNOGO TSENTRA PRI BOLEZNI DVIZHENIIA].

I. D. Pestov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 535-542. 12 refs. In Russian.

Study of the irritability of the emetic center of dogs with functioning and removed labyrinths, subjected to various types of motion. The irritability of the emetic center was measured by the minimum injected dose of apomorphine that caused vomiting. The diverse effects of various tests are discussed.

V. Z.

A66-29496 #

ELEMENTARY MODEL OF THE VESTIBULAR APPARATUS [ELEMENTARNAIA MODEL' VESTIBULIARNOGO APPARATA].

O. G. Gazenko, N. A. Chekhonadskii, A. N. Razumeev, and B. B. Egorov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 543-554. In Russian.

Development of an elementary model of the vestibular apparatus, emphasizing in particular the function of the otolithic part of this apparatus. The results of studies of the receptors of the otolithic part of the vestibular apparatus are cited. A study is made of the reactions of the receptor-neuron system to g-forces varying stepwise in time and varying periodically in time. The function and certain features of the "summing device," which compares pairs of signals coming from the left and right utricles and also from the sacculus, are discussed.

A. B. K.

A66-29497 #

SEMICONDUCTOR COOLER FOR SMALL ANIMALS [POLUPROVODNIKOVYI OKHLADITEL' DLIA MELKIKH ZHIVOTNYKH].

Iu. N. Logunov and Iu. S. Aliukhin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 555-559. In Russian.

Description of an experimental semiconductor cooler for creating a state of hypothermia in small animals. This cooler, operating on the Peltier effect and employing an intermetallic alloy of bismuth, tellurium, antimony, and selenium as the semiconductor material, permits smooth control of the cooling rate. The results of several series of tests of this device using anesthetized and dead white rats are cited.

A. B. K.

A66-29498

AUTOMATIC DEVICE FOR CREATING REVERSIBLE AND CONTROLLABLE HYPOTHERMIA FOR POSSIBLE USE UNDER SPACE-FLIGHT CONDITIONS [AVTOMATICHESKAIA USTANOVKA DLIYA SOZDANIA OBRATIMOI I REGULIRUEMOI GIPOTERMII DLIYA VOZMOZHNOGO ISPOL'ZOVANIA V USLOVIYAKH KOSMICHESKOGO POLETA].

E. V. Maistrakh, G. N. Il'iutkin, V. A. Konstantinov, I. V. Eremenko, S. A. Krasil'nikov, O. Iu. Lysenko, V. F. Matsatsa, and V. I. Privezentsev.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 573-580. In Russian.

Discussion of the theory underlying the development of automatic devices for creating and maintaining a state of reversible hypothermia in a living organism and description of a device actually developed. Various combinations of the parameters of the physiological functions included in the logic circuits of such a device are considered, and formulas for ensuring optimum temperature control are obtained. The structure and functioning of a device actually developed for creating hypothermia are described.

A. B. K.

A66-29499

METHOD OF RECORDING ACTION CURRENTS IN VEGETATIVE NERVES UNDER CHRONIC EXPERIMENTAL CONDITIONS [METODIKA REGISTRATSII TOKOV DEISTVIA V VEGETATIVNYKH NERVAKH V USLOVIYAKH KHONICHESKOGO EKSPERIMENTA].

A. D. Nozdachev.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 581-586. In Russian.

Description of a method of implanting electrodes in experimental animals (dogs) in the preganglionic and postganglionic branches of the caudal mesenteric node and the splanchnic and sinus nerves. The method of fabricating the electrodes used is outlined briefly, and a description is given of a special collector which is implanted in the region of the loins. A detailed account is given of the method of gaining access to the areas where the electrodes are to be implanted and of the actual process of implantation. Traces of action currents in the vegetative nerves detected 10 months after implantation of the electrodes are shown.

A. B. K.

A66-29500

METHOD OF RECORDING THE VENOUS OUTFLOW IN THE BRAIN VESSELS OF ANIMALS SUBJECTED TO ACCELERATIONS [METODIKA REGISTRATSII VEZNOGO OTTOKA V SOSUDAKH GOLOVNOGO MOZGA ZHIVOTNYKH V USLOVIYAKH DEISTVIA USKORENII].

V. Ia. Klimovitskii and V. F. Nikolaev.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 587-592. 20 refs. In Russian.

Description of a method of recording the blood flow rate in the large surface veins of the brains of animals subjected to accelerations. The proposed method is distinguished by the fact that the transmitting and receiving elements of the thermal transducer are set up on opposite sides of the vein or sinus venosus on the brain surface, with only one semiconductor thermal resistor being used. On the basis of preliminary results of tests of rabbits subjected to

head-to-pelvis accelerations according to this method, it is concluded that the main effect of such accelerations on the venous outflow is a decrease in the blood flow in the large veins and sinuses of the brain.

A. B. K.

A66-29501

TREATING THE SECRETIONS OF A HUMAN WITH THE AID OF A NATURALLY FORMING ALGAL-BACTERIAL COLONY [PERERABOTKA VYDELENNI CHELOVEKA S POMOSHCH'IU ESTESTVENNO SKLADYVAIUSHCHEGOSIA AL'GO-BAKTERIAL'NOGO SOBSHCHESTVA].

M. S. Rerberg, T. I. Vorob'eva, R. I. Kuz'mina, and I. M. Barkhatova.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 598-604. In Russian.

Method for biologically processing human secretions and regenerating water from the residue. The green protococcal alga *Chlorella vulgaris* in a naturally forming colony with bacteria was found to be useful for accomplishing such processing in a short period, although further work is needed to make the obtained water palatable.

R. A. F.

A66-29502

MEANS OF FORMULATION BY A HUMAN OF A SEQUENCE OF ACTIONS [K VOPROSU O SPOSOBAKH FORMIROVANIA CHELOVEKOM POSEDOVATEL'NOSTI DEISTVII].

N. A. Rokotova.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 631-641. 5 refs. In Russian.

Investigation of the manner in which a human "programs" a series of his own actions. Eighteen subjects were given a problem whose correct solution necessitated determining the correct order for a given set of actions and then carrying them out in the proper sequence. The distribution of the errors and the clustering of the responses made are analyzed.

R. A. F.

A66-29503

AUTOMATIC ANALYSIS OF THE PERIODIC DIURNAL VARIATIONS IN THE HUMAN ELECTROENCEPHALOGRAM [AVTOMATICHESKII ANALIZ SUTOCHNYKH PERIODICHESKIKH IZMENENII ELEKTROENTSEFALOGRAMMY CHELOVEKA].

D. I. Ivanov, V. B. Malkin, V. L. Popkov, E. O. Popova, and I. N. Cherniakov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 642-645. 9 refs. In Russian.

Discussion of the results of EEG observations of six healthy men, aged 20 to 23 yr. The recordings were taken four times each day for 10 to 30 days. Following the separation of individual rhythms by an analyzer with band filters, the EEG spectrum was analyzed by a periodometer. The periodometer determined the frequency characteristic of each EEG wave and measured the number of oscillations at a given frequency per unit time.

V. Z.

A66-29504

OBSERVATIONS ON FISH CONFINED IN SEALED AQUARIA WITH AND WITHOUT CHLORELLA [OPYT SODERZHANIYA RYB V GERMETICHESKIKH AKVARIUMAKH S KHLORELLO I BEZ NEE].

L. M. Antsyshkina, N. S. Kirilenko, V. Ia. Mamontov, G. B. Mel'nikov, and F. P. Riabov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 646-654. In Russian.

Discussion of the biological effects on the silver crucian of confinement in a sealed aquarium with and without *Chlorella* as a source of food and oxygen. The variations in weight and the time of survival of aquarium fish and control fish are compared.

V. Z.

A66-29505 #

VARIANT METHOD OF DETERMINING THE MAXIMUM RATE OF PHOTOSYNTHESIS BY CHLORELLA [VARIANT OPREDELENIIA MAKSIMAL'NOGO FOTOSINTEZA KHLORELLY].

E. A. Ivanov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 655-657. In Russian.

Attempt to determine the highest practically attainable photosynthetic capacity for Chlorella from cell reproduction rates obtained experimentally. Using a formula analogous to that of Schmalhausen, it is found that the theoretical maximum rate of photosynthesis is attained when the density of cells is zero. Experimental results indicate, however, that 1 liter of a Chlorella cell suspension could provide a human organism with the required amount of oxygen.

V. Z.

A66-29506 #

SENSORS FOR THE AUTOMATIC CONTROL AND REGULATION OF THE PHYSIOLOGICAL PROCESSES OF PLANTS IN CLOSED SYSTEMS [DATCHIKI DLIA AVTOMATICHESKOGO KONTROLIA I REGULIROVANIA FIZIOLOGICHESKIKH PROTSESOV RASTENII V ZAMKNUTYKH SISTEMAKH].

V. I. Rozhdestvenskii and V. G. Chuchkin.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 658-669. 10 refs. In Russian.

Examination of the possibility of constructing a device to measure the intensity (or rate) of physiological processes in growing plants, with a view to automatic growth control in a closed system. The principles and configuration of a system for measuring the photosynthesis rate of plants by measuring their CO₂ production is derived. On this basis, other systems for measuring such parameters as potassium and water absorption are outlined.

R. A. F.

A66-29507 #

PECULIARITIES OF THE NUTRITION OF PLANTS GROWN IN AIR IN A CLOSED SYSTEM OF CULTIVATION [OB OSOBNOSTIAXH PITANIIA RASTENII PRI VYRASHCHIVANII IKH V VOZDUSHNOI KUL'TURE DLIA ZAMKNUTOI SISTEMY].

I. V. Tsvetkova, Iu. I. Shaidarov, and V. M. Abramova.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 670-675. 15 refs. In Russian.

Experimental study of the assimilation by Chinese cabbage plants of the products of mineralization of human wastes. The plants were grown without substrate in an isolated medium of air saturated with water vapor and were fed by periodically spraying their roots with a solution of mineralized wastes containing additional nitrogen, phosphorus, and potassium. The immunity of these plants to the high chloride concentrations that accumulate in such nutrients has been established.

V. Z.

A66-29508 #

CONDITIONS OF CARBON NUTRITION FOR AN INTENSIVE CHLORELLA CULTURE [USLOVIA UGLERODNOGO PITANIIA KHLORELLY V INTENSIVNOI KUL'TURE].

G. I. Meleshko and L. M. Krasotchenko.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 676-682. 8 refs. In Russian.

Determination of the CO₂ concentration in air that is required for Chlorella cells to perform photosynthesis. The behavior of suspensions of thermophilic Chlorella cells in culture media is studied in a closed and controlled air-CO₂ system. It is found that special efforts are required to replenish CO₂ influx to cells active in photosynthesis when thick Chlorella cell suspensions are employed, with a daily CO₂ yield greater than 100 to 130 liters per liter of suspension.

V. Z.

A66-29509 #

DENSE CONTINUOUS CHLORELLA CULTURE AT VARIOUS ILLUMINATION LEVELS [PLOTNOSTNOE NEPRERYVNOE KUL'TIVIROVANIE KHLORELLY PRI RAZLICHNYKH OSVESHCHEN-NOSTIAKH].

I. A. Terskov, I. I. Gitel'zon, F. Ia. Sid'ko, V. N. Belianin, B. G. Kovrov, I. S. Eroshin, and V. A. Batov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 683-686. In Russian.

Determination of the optimum illumination levels for growth of thermophilic Chlorella vulgaris cell suspensions with 2×10^9 , 3×10^9 , and 4×10^9 cells per milliliter of suspension. Curves of the biological mass growth at exposures of 0.260 to 1.202 cal/cm²-min showed an initial intensive stimulation of growth that subsided with time of exposure.

V. Z.

A66-29510 #

CONSUMPTION OF MINERAL-NUTRITION ELEMENTS BY CHLORELLA CELLS IN AN INTENSIVE CULTURE [POTREBLENIE ELEMENTOV MINERAL'NOGO PITANIIA KLETKAMI KHLORELLY V INTENSIVNOI KUL'TURE].

E. K. Lebedeva, G. I. Meleshko, and A. N. Shakhova.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 687-693. 22 refs. In Russian.

Determination of the consumption of mineral-nutrition elements by Chlorella pyrenoidosa S-39. The elementary chemical composition of a Chlorella biomass is determined on the basis of experiments. A study is made of the removal of nitrogen from the culture medium and its incorporation into the composition of a Chlorella biomass. The removal of magnesium and phosphorus from the culture medium is also studied. A calculation is made of the quantities of mineral-nutrition elements which must be added in the form of acids and salts to the culture medium to correct deficiencies in the composition of a Chlorella biomass.

A. B. K.

A66-29511 #

CHANGES IN THE HEMATOCRIT INDEX AND THE ARTERIAL-BLOOD GAS COMPOSITION IN WHITE RATS DURING ARTIFICIAL HYPOTHERMIA [IZMENENIIA POKAZATELIA GEMATOKRITA I GAZOVOGO SOSTAVA ARTERIAL'NOI KROVI U BELYKH KRYIS PRI ISKUSSTVENNOI GIPOTERMII].

G. D. Glod.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 694-700. 5 refs. In Russian.

Determination of the effectiveness of various methods of artificial hypothermia in white rats on the basis of a study of the respiration and arterial-blood gas composition of the subjects for various degrees of cooling. A study is made of the changes in the hematocrit index and arterial-blood gas composition of rats subjected to three different cooling methods: (1) under conditions of increasing hypercapnia and hypoxia, (2) cooling in an artificial gaseous medium consisting of 15% CO₂, 40% O₂, and 45% nitrogen, and (3) by blocking the afferent nerves by intramuscular injection of a lytic mixture before cooling. It is found that the most effective cooling method is the method of cooling under conditions of increasing hypercapnia and hypoxia.

A. B. K.

A66-29512 #

SIMULATION OF RADIATION CONDITIONS DURING THE OCCURRENCE OF A SOLAR FLARE ON A CIRCULUNAR TRAJECTORY [MODELIROVANIE RADIATSIONNYKH USLOVII PRI VOZNIKNOVENII SOLNECHNOI VSPYSHKIIA TRAEKTORII OBLETA LUNY].

V. S. Morozov, V. S. Shashkov, B. I. Davydov, V. V. Antipov, P. P. Saksonov, and N. N. Dobrov.

IN: PROBLEMS OF SPACE BIOLOGY. VOLUME 4 [PROBLEMY KOSMICHESKOI BIOLOGII. VOLUME 4].

Edited by N. M. Sisakian.

Moscow, Izdatel'stvo Nauka, 1965, p. 701-708. 12 refs. In Russian.

Laboratory simulation of the effect of ionizing radiation due to solar flares on white mice traveling in spaceships along a circum-lunar trajectory. Simulation studies are made of a short-term solar flare and of one of the possible variants of the radiation conditions occurring during a flight to the moon, and estimates are given of the variation in the dose rate during simulation of a solar flare and of a flight to the moon. The survival rate and lifetimes of mice irradiated according to both schemes are determined, and a study is made of the protective action of certain chemical preparations during irradiation according to the moon-flight scheme. It is found that the most effective radiobiological protective action in this case is provided by AET (aminoethylisothionure). A. B. K.

A66-29649

CHANGES IN THE SHAPE OF THE THORACIC WALL DURING STATIC RESPIRATION [VARIAZIONI DI FORMA DELLA PARETE TORACICA DURANTE SFORZI RESPIRATORI STATICI].

Emilio Agostoni and Piero Mognoni (Milano, Università, Istituto di Fisiologia Umana, Milan, Italy).

Accademia Nazionale dei Lincei, Atti, Rendiconti - Classe di Scienze Fisiche, Matematiche e Naturali, vol. 38, June 1965, p. 929-932. In Italian.

Contract No. AF 61(052)-867.

Investigation of changes in the shape of the chest wall during static respiration performed at the end of: (1) spontaneous expiration, (2) maximum expiration, and (3) maximum inspiration. The results obtained show that during static inspiration the horizontal section of the rib cage at the xiphoid level generally becomes more elliptical, while it becomes more circular during expiration. Therefore, the force of the respiratory muscles is unevenly distributed and acts mainly on the lateral portion of the rib cage. In about 50% of cases the horizontal section of the rib cage is smaller during inspiration and is larger during expiration than during relaxation with the same lung volume. The changes in the shape of the chest wall during static respiration suggest that during hyperventilation and when the resistance to breathing is increased, the breathing effort is greater than that calculated on the basis of the volume-pressure relation, since part of the force exerted by the muscles is expended in deforming the chest wall. M. M.

A66-29650

SPECULATIONS ON SMELL.

Jerome Y. Lettvin (Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge, Mass.) and Robert C. Gesteland (Scientific Engineering Institute, Waltham, Mass.).

IN: COLD SPRING HARBOR SYMPOSIA ON QUANTITATIVE BIOLOGY. VOLUME 30.

New York, Cold Spring Harbor Laboratory of Quantitative Biology, 1965, p. 217-225. 6 refs.

Research supported by the Bell Telephone Laboratories; Contracts No. DA-36-039-AMC-03200(E); No. AF 33(615)-1747; NSF Grant No. GP-2495; Grant No. NSG-496.

Informal discussion of some experimental research into the nature of the olfactory code. Some psychological questions of smell are reviewed, together with results from measurements for the manner in which an olfactory receptor is affected. It is concluded that there are almost certainly specific chemically sensitive molecules or molecular traps. The nature of these traps and their role in olfactory coding are tentatively outlined. R. A. F.

A66-29734

PHYSIOLOGICAL METHODS IN ASTRONAUTICS [FIZIOLOGICHESKIE METODY V KOSMONAVTIKE].

R. M. Baevskii.

Edited by V. V. Parin and O. G. Gazenko.

Moscow, Izdatel'stvo Nauka, 1965. 300 p. In Russian.

This book is devoted to a wide assortment of problems related to the advances made in methods of obtaining medicobiological information from outer space. It is intended to be of use not only to specialists working in the field of astronautics, but also to a considerable number of doctors, physiologists, engineers, and mathematicians concerned with problems of collecting, transmitting, and processing medical information. A brief historical outline is given of physiological studies in outer space. The theory of transmission of physiological information from a spaceship to earth is discussed.

A detailed description is given of a modern system for carrying out physiological measurements on a spaceship. The principles of construction of physiological measurement and information systems for ensuring spaceflights of long duration and range are outlined. Certain problems involved in physiological measurements in interplanetary flights are considered. Methods of studying the cardiovascular system, the neuromuscular system, and the vestibular apparatus are described. A. B. K.

A66-29959

DAILY RHYTHM CHANGES ASSOCIATED WITH VARIATIONS IN LIGHT INTENSITY AND COLOR.

C. M. Winget (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.) and D. H. Card (NASA, Ames Research Center, Instrumentation Div., Moffett Field, Calif.).

COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper. 19 p. 16 refs.

Quantitative evaluation of daily rhythm changes associated with changes in light intensity at a given wavelength of light. Two normal chickens were used to study three daily physiological rhythms in a controlled environment for approximately 80 days. The presence of the cycles was established by periodogram and correlogram analysis. The physiologic systems studied are arrhythmic in continuous red light. No change was observed in the periods of the daily rhythms with an increase in light intensity. Deep body temperature oscillations were greater at the higher light intensities and appeared to dissociate from the heart rate. Activity and heart rate showed a high degree of correlation even at the higher intensities. M. M.

A66-29960

ECOLOGICAL PATTERNS OF MICROORGANISMS IN DESERT SOILS.

John B. Opfell and George P. Zebal (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).

COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper. 15 p. 17 refs.

Discussion of the results of exploratory tests conducted on hardy aerobic microbial populations of the Atacama Desert, an arid area in north central Chile, with borax lakes and saline and nitrate deposits. The results are used to provide some understanding of the environment and of the ecological patterns of microorganisms in soils of the earth's driest deserts. M. M.

A66-29961

EXTRATERRESTRIAL LIFE DETECTION BY MEANS OF ISOTOPIC OXYGEN EXCHANGE.

Bessel Kok and Joseph E. Varner (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).

COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper. 17 p. 13 refs.

Contract No. NASw-1054.

Description of a method for detecting possible extraterrestrial life, based upon the catalysis of oxygen exchange between O_2 labeled oxyanions and water, a property which appears to be unique to living systems. The spontaneous exchange of O_2 between water and several of the common oxyanions is extremely slow, even in the presence of inorganic or simple organic molecules; thus the background signal is low. The method is also general because very few assumptions are made concerning the chemical nature of life. In tests of soils and bacterial cells, this method has shown promise as a simple, general, and unambiguous experiment. The apparatus consists of a small mass spectrometer, a simple inlet system and associated hardware. A minimum telemetry capacity is required. The entire system, including the inorganic chemicals required, is indefinitely stable and can be sterilized by heat. M. M.

A66-29962

BIOLOGICAL MACROMOLECULE DETECTION BY USE OF A THIACARBOCYANINE DYE.

E. R. Walwick, R. E. Kay, and B. R. Zalite (Philco Corp., Aeronutronic Div., Newport Beach, Calif.).

COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper. 21 p. 9 refs.

Contract No. NASw-770.

Description of research on a program to demonstrate the utility of the dye, 4,5,4',5'-dibenzo-3,3'-diethyl-9-methylthiacarbocyanine bromide for the detection of biological macromolecules. The method

of detection is based on the observation of spectral changes resulting from reaction of this dye with anionic sites of macromolecules. These changes produce absorption spectra which are different from the spectrum of the aqueous dye solution. The most obvious changes involve large increases in absorbance at specific wavelengths which showed little absorbance prior to the change. The experimental evidence includes silicate determination in concentrated soil extracts before and after alkaline dialysis to show reduction of silicate to levels that would not change the dye spectrum. It also includes evidence that the dye spectrum is not altered by extracts of pure inorganic materials processed by a soil extraction procedure. M. M.

A66-29965

THE SURVIVAL OF MICROORGANISMS IN SPACE - FURTHER ROCKET AND BALLOON BORNE EXPOSURE EXPERIMENTS. John Hotchin, Peter Lorenz, Aletha Markusen, and Curt Hemenway (Union University, Dudley Observatory, Albany; New York State Department of Health, Div. of Laboratories and Research, New York; New York, State University, Albany, N. Y.). COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper, 7 p. Grant No. NSG-155-61.

Results of survival studies of terrestrial microorganisms exposed directly to the space environment on two balloons and two rocket flights. A total of 756 separate exposure units - each approximately 5 x 5 mm in area - were flown in the four experiments. The organisms used were coliphage T₁, penicillium roqueforti mold spores, poliovirus type I, and bacillus subtilis spores. The organisms were either deposited by direct spraying upon vinyl coated metal units or by droplet seeding into shallow depressions. The results for coliphage T₁ are tabulated; it is evident that the stability of the coliphage was intermediate and the poliovirus showed some survival in all flight experiments. A table is presented which expresses the survival factor in terms of the different conditions used. D. P. F.

A66-29966

A DISCUSSION OF THE PLANETARY QUARANTINE CONSTRAINTS. J. O. Light, C. W. Craven (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), W. Vishniac (Rochester, University, Rochester, N. Y.), and L. B. Hall (NASA, Washington, D. C.). COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper, 16 p.

Demonstration of the incompleteness of the current standards for planetary quarantine because they do not consider all of the numerous sources of potential biological contamination. It is also shown that the allocation process necessary to distribute the total probability of contamination to each of these numerous and complex sources of contamination will be a prodigious and detailed task. The following statement of the appropriate level of commitment is recommended: the planetary quarantine policy shall require 99.9% confidence that the unmanned exploration of Mars will not contaminate the planet with terrestrial organisms. A partial list and discussion of the numerous sources of contamination which must be considered by the set of planetary quarantine constraints is provided. M. M.

A66-29996

BIOLOGICAL AND ENGINEERING ASPECTS OF SPACECRAFT STERILIZATION.

Harold G. Lorsch and Martin G. Koesterer (General Electric Co., Missile and Space Div., King of Prussia, Pa.). COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper, 9 p. 21 refs. Contracts No. NAS 8-11372; No. NAS 8-11107.

Description of work performed to solve the biological and engineering problems inherent in the current approach for the sterilization of planetary probes by the manufacture and assembly of hardware under tight contamination control followed by a terminal dry heat treatment. Andersen and Reyniers bacterial samplers were employed to evaluate the natural levels of microorganisms in the air. The Rodac contact agar plate, moistened cotton swab, and immersion rinse techniques were used for surfaces. The effects of heating typical spacecraft hardware were theoretically analyzed and then experimentally verified on a 200-lb entry vehicle which

simulated a planetary lander. Presently planned sterilization cycles vary from 160°C for three hours to 105°C for 14 days. Thus, transient periods constitute a major portion of the total sterilization cycle, especially at the higher sterilization temperatures. M. M.

A66-30003

ROLE OF WEIGHTLESSNESS IN THE STATE OF VIGILANCE DURING THE FLIGHT OF ASTRONAUTS [LA PART DE L'ABSENCE DE PESANTEUR DANS LE PROCESSUS DE VIGILANCE AU COURS DE VOLS COSMONAUTIQUES]. R. Grandpierre and G. Chatelier. COSPAR, International Space Science Symposium, 7th, Vienna, Austria, May 10-19, 1966, Paper, 7 p. In French.

Consideration of the lowering of the psychic tone, tendency toward absentmindedness, and decline of vigilance observed during the course of the prolonged weightlessness experienced by astronauts on long spaceflights. Contrary to what is true for sensations of disorientation, the decline in vigilance does not seem capable of modification by prior training. D. P. F.

A66-30273

MECHANISM OF ATTENUATION OF HYPOXIC HYPOXIA BY ENRICHING THE AIR INTAKE WITH CO₂ [SUR LE MECANISME DE L'ATTENUATION DE L'HYPOXIE HYPOXIQUE PAR L'ENRICHISSEMENT EN CO₂ DE L'AIR INSPIRE].

Maurice-Vital Strumza (Paris, Université, Laboratoire de Biologie Aéronautique, Paris, France).

Académie des Sciences (Paris), Comptes Rendus, Série D - Sciences Naturelles, vol. 262, no. 16, Apr. 18, 1966, p. 1740, 1741. In French.

Study of the effect of the addition of a small proportion of CO₂ to the air intake on certain perturbations related to moderate hypoxic hypoxia. From a study of the gaseous exchanges occurring in the lungs upon introduction of a small amount of CO₂ into an oxygen-poor air intake mixture it is found that the oxygen partial pressure in the alveolar air is higher than in the case of hypocapnic hypoxia of the same intensity. A. B. K.

A66-30346

ATMOSPHERE SELECTION AND CONTROL FOR MANNED SPACE STATIONS.

F. A. Parker, D. R. Ekberg, D. J. Withey, and C. V. Dohner (General Electric Co., Philadelphia, Pa.).

(Deutsche Gesellschaft für Raketentechnik und Raumfahrt, International Symposium on Manned Space Stations, Munich, West Germany, Sept. 10, 1965, Paper.)

Raumfahrtforschung, vol. 10, Apr.-June 1966, p. 58-64. 9 refs.

Analysis of the optimum pressures, gas concentrations, and temperatures for a manned space station. The results indicate that an optimum environment should exhibit a system pressure of roughly 1/2 atm and that it should consist of 50% oxygen and 50% nitrogen or helium. Requirements with respect to total weight and cabin decompression are established. Fire hazard considerations and physiological factors are examined. V. P.

A66-30357

CHEMICAL STUDIES ON THE ORIGIN OF LIFE.

Cyril Ponnampuruma (NASA, Ames Research Center, Moffett Field, Calif.).

IN: VIRGINIA POLYTECHNIC INSTITUTE, CONFERENCE ON THE EXPLORATION OF MARS AND VENUS, VIRGINIA POLYTECHNIC INSTITUTE, BLACKSBURG, VA., AUGUST 23-27, 1965, PROCEEDINGS. [A66-30350 16-30]

Conference supported by the National Aeronautics and Space Administration, and the U.S. Air Force Cambridge Research Laboratories.

Blacksburg, Va., Virginia Polytechnic Institute, 1965, p. VII-1 to VII-8. 18 refs.

Description of chemical laboratory experiments designed to reveal which materials and conditions in the universe might create chemical components and structural attributes of life as it is known on earth. It is found that molecules of biological significance can be synthesized abiologically. B. B.

A66-30462

THE DESIGN OF FULL PRESSURE GARMENTS WITH RESPECT TO SPECIFIC MISSION OBJECTIVES AND ENVIRONMENTAL CONDITIONS.

Frank J. DiStefano (David Clark Co., Inc., Worcester, Mass.).
IN: INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING, SAN DIEGO, CALIF., APRIL 13-15, 1966, PROCEEDINGS. [A66-30434 16-11]
Mt. Prospect, Ill., Institute of Environmental Sciences, 1966, p. 203-208.

Review of various full-pressure suit designs for high-altitude and space missions. The problem of materials selection is considered in relation to human physiological requirements. Suit designs for use in high-altitude fighter aircraft and bombers and Gemini intravehicular and extravehicular missions are described. A range of designs for complex and extended missions, such as the Apollo Lunar Mission, is suggested.

B. B. K.

A66-30492

AN ENGINEER LOOKS AT SPACECRAFT STERILIZATION.

Albin Millard Nowitzky.
IN: INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING, SAN DIEGO, CALIF., APRIL 13-15, 1966, PROCEEDINGS. [A66-30434 16-11]
Mt. Prospect, Ill., Institute of Environmental Sciences, 1966, p. 471-479. 15 refs.

Outline of acceptable techniques of spacecraft sterilization, which are the result of an intensive analysis of applicable biomedical laboratory methodology. These techniques anticipate a previously determined vehicle internal contamination level before the application of the contaminant-reduction or sterilization process. Major design considerations are noted, internal contamination and sterilization are discussed, and development of the sterilization qualified products list (SQPL) is described.

B. B.

A66-30493

TEST ENVIRONMENTS ASSOCIATED WITH THE STERILIZATION OF PLANETARY CAPSULES.

Gordon P. Kautz (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING, SAN DIEGO, CALIF., APRIL 13-15, 1966, PROCEEDINGS. [A66-30434 16-11]
Mt. Prospect, Ill., Institute of Environmental Sciences, 1966, p. 481-483.

Study of the sterilization of a capsule intended to enter the atmosphere of, or land on a planet. This plan for the sterilization of a planetary capsule has as its objective the launching of a capsule of demonstrated reliability and certified sterility. Time vs temperature cycles for sterilization are discussed, and type-approval and flight-acceptance tests are explained. A plan for sterilization of a typical flight capsule is outlined, and capsule assembly and system testing are described.

B. B.

A66-30494

THE STERILITY CONTROL OFFICER AND THE STERILITY CONTROL GROUP - NEW FIGURES ON THE AEROSPACE SCENE.

Myron H. Bengson and Fred W. Thomae, Jr. (General Electric Co., Missile and Space Div., Valley Forge, Pa.).
IN: INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING, SAN DIEGO, CALIF., APRIL 13-15, 1966, PROCEEDINGS. [A66-30434 16-11]
Mt. Prospect, Ill., Institute of Environmental Sciences, 1966, p. 485-489.

Review of sterility control in the aerospace industry. A sterility program plan to be followed during manufacture of spacecraft components is introduced, sterility control group functions during prototype activity are outlined, and identification of sensitive parts, components, and subsystems is discussed.

B. B.

A66-30496

MICROBIOLOGICAL CONTAMINATION CONTROL IN SPACECRAFT STERILIZATION.

Franklin H. Farmer (NASA, Langley Research Center, Spacecraft Sterilization Group, Hampton, Va.).

IN: INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING, SAN DIEGO, CALIF., APRIL 13-15, 1966, PROCEEDINGS. [A66-30434 16-11]

Mt. Prospect, Ill., Institute of Environmental Sciences, 1966, p. 513-516.

Determination of the measures required to provide microbial contamination control during the presterilization assembly and post-sterilization handling of interplanetary space vehicles. The microbiological basis of the present NASA dry heat sterilization requirements is reviewed, and microbial burden control before and after terminal sterilization is discussed.

B. B.

A66-30507

ERGONOMIC FACTORS IN THE DESIGN OF EXTENDED DURATION MANNED UNDER-WATER SYSTEMS.

I. Streimer (San Fernando Valley State College, Northridge, Calif.).
IN: INSTITUTE OF ENVIRONMENTAL SCIENCES, ANNUAL TECHNICAL MEETING, SAN DIEGO, CALIF., APRIL 13-15, 1966, PROCEEDINGS. [A66-30434 16-11]
Mt. Prospect, Ill., Institute of Environmental Sciences, 1966, p. 625-628. 27 refs.

Discussion of factors which it is thought will affect the work output characteristics and capabilities of undersea operators. Analogies are drawn to problems encountered by investigators of space crew work output characteristics, and anticipated performance decrements are considered in terms of their impact on such system variables as environmental control system design and sizing, manning requirements, and work-rest cycles.

B. B.

A66-30546

RESEARCH AND DEVELOPMENT WORK ON PERSONAL TELEMETRY SYSTEMS.

Adolf R. Marko (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Biophysics Laboratory, Wright-Patterson AFB, Ohio).
IN: 1965 INTERNATIONAL TELEMETERING CONFERENCE, WASHINGTON, D.C., MAY 18-20, 1965, PROCEEDINGS. [A66-30534 16-07]

Symposium sponsored by the International Foundation for Telemetering.

Sun Valley, Calif., John F. Caler Scholarly Publications, 1965, p. 253-257. 8 refs.

Discussion of personal telemetry systems, defined as small-size, self-contained, short-range telemetry units which are employed to obtain physiological measurements from an unencumbered human or animal subject. Investigations of pulse duration multiplexing resulted in the development of a seven-channel personal telemetry unit. Theoretical analysis and field tests revealed advantages of the pulse duration approach, depending upon the acceptability of the limited frequency response. For a number of selected physiological measurements under the specified conditions, the system described is considered superior in terms of performance, and more economical because of fewer components compared to the FM system.

F. R. L.

A66-30622

INTRAVASCULAR PRESSURE MEASUREMENTS DURING VIBRATION.

J. H. Dines, J. H. Sutphen, L. B. Roberts, and W. F. Ashe. (American Academy of Occupational Medicine, Annual Meeting, 17th, Columbus, Ohio, Feb. 17-19, 1965, Paper.)
Archives of Environmental Health, vol. 11, Sept. 1965, p. 323-326.
National Institutes of Health Grant No. OH-00006-05.

Cardiovascular measurements made on anesthetized dogs while they were being subjected to various vibration intensities. The modifications made to an existing blood-pressure catheter transducer so that it could be used to make measurements during vibration are described. The measurements reported here were made primarily to test the instrument sensitivity, types of anesthesia, recording techniques, and methods of restraining the subjects.

R. A. F.

A66-30623 #**LOW AMBIENT PRESSURE ENVIRONMENTS AND TOXICITY.**

Anthony A. Thomas (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Toxic Hazards Branch, Wright-Patterson AFB, Ohio).

(American Academy of Occupational Medicine, Annual Meeting, 17th, Columbus, Ohio, Feb. 17-19, 1965, Paper.)

Archives of Environmental Health, vol. 11, Sept. 1965, p. 316-322. USAF-sponsored research.

Study of the effects of low atmospheric pressure and oxygen-rich atmospheres on the characteristics of uninterrupted long-term exposure to toxic gases and vapors that are encountered in the atmospheres of space cabins. The testing chambers, called "Thomas Domes," are described. Tests are described in which rats, mice, dogs, and monkeys were exposed to 5-psia oxygen atmospheres for periods of 2 weeks and 90 days.

R. A. F.

A66-30624**PHYSIOLOGICAL FACTORS IN DECOMPRESSION SICKNESS.**

Abraham T. K. Cockett, Robert M. Nakamura (Harbor General Hospital, Torrance, Calif.), and Ray T. Kado (California, University, School of Medicine, Dept. of Surgery, Dept. of Urology, and Dept. of Pathology, Los Angeles, Calif.).

Archives of Environmental Health, vol. 11, Dec. 1965, p. 760-764. 14 refs.

Contract No. AF 49(638)-1387; Grant No. NSG-237-62.

Review of work on the treatment of decompression sickness. A method for the production of experimental decompression sickness (dysbarism) is outlined. Dextran infusion in replacement therapy appears beneficial. The mechanisms operating in dysbarism are mentioned. Hypothermia appears to be useful and may be indicated. Recompression is the treatment of choice. Plasma replacement is clearly indicated.

R. A. F.

A66-30634**INDOLYLACROYL GLYCINE EXCRETION IN MAN.**

Arnold J. Mandell and Robert T. Rubin (California, University, Center for Health Sciences, Neuropsychiatric Institute, Biochemical Correlates Laboratory, Los Angeles, Calif.).

Life Sciences, vol. 4, no. 17, 1965, p. 1657-1664. 11 refs.

Research supported by the National Institute of Arthritis and Metabolic Diseases Grant No. AM-09526; Grant No. NSG-237-62.

Study of the frequency of occurrence and amounts of urinary excretion of indolylacroyl glycine (I-Acr-Gly) in a large group of subjects and results of a study of the role of diet and bowel flora in its excretion. Data from isotope studies are presented which suggest an endogenous production of I-Acr-Gly in the mammalian organism in addition to the contributions from diet and bowel bacteria. The methods used in the experiments are described and the results are graphed. From the results it appears that I-Acr-Gly is a frequently present metabolite in the urine of man, and its previously reported presence in some pathological states may have been adventitious rather than pathognomonic. In addition, plant and bacterial cells appear to be exogenous sources of indolylacrylic acid.

M. F.

A66-30635**URINARY EXCRETION OF 3-METHOXY-4-HYDROXYMANDELIC ACID DURING DREAMING SLEEP IN MAN.**

Arnold J. Mandell, Peter L. Brill, Mary P. Mandell, Jack Rodnick, Robert T. Rubin, Robert Sheff, and Benjamin Chaffey (California, University, Center for Health Sciences, Neuropsychiatric Institute, Biochemical Correlates Laboratory, Los Angeles, Calif.).

Life Sciences, vol. 5, no. 2, 1966, p. 169-173. 13 refs.

U.S. Public Health Service Grant No. 2-T2-MH-5996-11; Grant No. NSG-237-62.

Study of 12 rapid eye movement sleep (REMS) epochs in four subjects. Mean and standard deviation values of urinary 3-methoxy-4-hydroxymandelic acid (VMA) for REM and non-REM sleep states are tabulated, which show a consistently higher value for the REMS epochs.

B. B.

A66-30636**GASTRIC PATHOLOGIC AND BIOCHEMICAL CHANGES INDUCED BY STARVATION OF WEANLING RATS.**

C. J. Pfeiffer, J. R. Debro, and P. J. Muller (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.).

Life Sciences, vol. 5, no. 6, 1966, p. 509-519. 41 refs.

Observation in the gastric mucosa of a differential response of weanling rats (21 days) vs post-weaned rats (24-180 days) to short-term starvation. Starvation induces ulceration in the glandular mucosa but not in the forestomach of 21-day-old rats, and a reversal of this susceptibility to ulceration occurs in older rats. The development of glandular lesions in weanling rats progresses with the duration of the fast, and parallels thymic involutions, increases in relative adrenal weight, and other stress responses. Gastric mucosal glucose-6-phosphate dehydrogenase decreases significantly at the fifth day of fasting. It is suggested that the fasted weanling rat may afford a useful tool in experimental gastroenterology, and the development of gastric glandular lesions may relate to impaired carbohydrate metabolism of the mucosa.

F. R. L.

A66-30647**THE REDUCING POWER GENERATED IN PHOTOACT I OF PHOTOSYNTHESIS.**

Bessel Kok, Hans J. Rurainski, and Olga V. H. Owens (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.).

Biochimica et Biophysica Acta, vol. 109, 1965, p. 347-356. 14 refs.

National Institutes of Health Contract No. PH-43-63-36; Contracts No. AF 49(638)-947; No. NASw-747.

The photoreduction of viologen dyes having E_0' values between -0.32 and -0.74 v was studied with isolated chloroplasts. Compared to ferricyanide, all compounds mediated photosynthetic oxygen evolution and photophosphorylation with equal rate and efficiency. The concentration required for maximum stimulation increased with decreasing normal potential. Under anaerobic conditions, an accumulation of the reduced viologens could be observed directly. Despite the interference of a back reaction with photosynthetically evolved O_2 , compounds with $E_0' > -0.55$ could be reduced completely, lower-potential agents partially. It is concluded that the normal potential of the strong reductant, generated in the long-wave photoact of photosynthesis is as low or lower than -0.7 v.

(Author)

A66-30648**SOME PHOTOCHEMICAL PROPERTIES OF CHLOROPLAST PREPARATIONS FROM THE CHRYSOMONAD HYMENOMONAS SP.**

S. W. Jeffrey, J. Ulrich, and M. B. Allen (Kaiser Foundation Research Institute, Laboratory of Comparative Biology, Richmond, Calif.).

Biochimica et Biophysica Acta, vol. 112, 1966, p. 35-44. 5 refs.

AEC Contract No. AT (04-3)-232; Contract No. Nonr-3015(00).

A procedure for isolation of morphologically intact and photochemically functional chloroplasts from the marine chrysomonad *Hymenomonas* sp. is described. The Hill reaction activity of these chloroplasts is comparable to that of higher plant preparations; their photophosphorylation activity is somewhat lower. The *Hymenomonas* chloroplasts retained 25-30% of the CO_2 fixation capacity of the whole cells.

(Author)

A66-30649**FREE FATTY ACID RESPONSES TO TILTING AFTER WATER IMMERSION.**

Jack K. Goldman (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Journal of Applied Physiology, vol. 20, May 1965, p. 395-397. 11 refs.

Evaluation of the integrity of sympathetic nervous system function following water immersion, by measuring plasma-free fatty acid responses to passive tilting after immersion. Response was impaired, as would be expected if sympathetic nervous system dysfunction is involved in postimmersion orthostatic intolerance.

R. A. F.

A66-30650**EXPOSURE SYSTEM FOR SMALL ANIMALS AT ATMOSPHERIC AND REDUCED PRESSURES.**

P. D. Quattrone and R. W. Staley (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.).

Journal of Applied Physiology, vol. 21, Mar. 1966, p. 741-744.

An exposure system is described which provides for chronic exposure of experimental animals (rats) to selected gaseous environments of varied composition and pressure (150-760 mm Hg absolute). The system includes specially designed exposure capsules, a gas flow system, an automatic pressure-regulation system, and a respiratory gas analyzer for operation at both atmospheric and reduced pressures. The system has been operated at reduced pressure (450 mm Hg absolute) for a period of 64 days with no apparent operational problems and provided ± 5 mm Hg pressure control. Air control animals at atmospheric pressure over this period demonstrated that: (1) the capsule environment did not restrict the animals, and (2) growth rates and food consumption data did not differ appreciably from that for animals in metabolic cages. (Author)

A66-30793 #**EFFECT OF ULTRASONIC WAVES ON THE ISOLATED A-CHAIN OF A HUMAN GAMMA GLOBULIN MOLECULE [DEISTVIE UL'TRA-ZVUKOVYKH VOLN NA IZOLIROVANNYE A-TSEPI MOLEKULY GAMMA-GLOBULINA CHELOVEKA].**

O. M. Zorina, L. I. Stekol'nikov, and I. E. El'piner (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR).

Akademiia Nauk SSSR, Doklady, vol. 167, Apr. 11, 1966, p. 1164-1167. 13 refs. In Russian.

Data on splitting the individual fragments and isolated polypeptide chains of the gamma globulin molecule, using ultrasonic waves. This information is expected to be of value in the further study of the particular characteristics of the structure of this protein and in clearing up the question of active-center localization in antibody molecules. R.A.F.

A66-30807**EXPERIMENTAL DETERMINATION OF A PORTION OF THE HUMAN VESTIBULAR SYSTEM RESPONSE THROUGH MEASUREMENT OF EYEBALL COUNTERROLL.**

R. A. Hannen, M. Kabrisky, C. R. Replogle, V. L. Hartzler, and P. A. Roccaforte (USAF, Air University, Institute of Technology, Wright-Patterson AFB, Ohio).

IEEE Transactions on Bio-Medical Engineering, vol. BME-13, Apr. 1966, p. 65-70. 14 refs.

USAF-supported research.

This work was undertaken to obtain a description of a portion (the otolith organs) of the human vestibular system. The vestibular system is fairly inaccessible; thus, measurement by direct observation is difficult. Previous research has shown that eyeball counterroll is one external manifestation of the vestibular system response. In this work, therefore, an indirect measurement of the human vestibular system response was obtained through the measurement of eyeball counterroll. Human subjects were rotated about an axis through their line of sight at angular velocities varying from 0-20r/min. The right eye was photographed and the angle of eyeball counterroll was determined by an optical correlation process. A mathematical expression for input-output characteristics for rotation inputs was formulated using Fourier curve fitting techniques. This description indicates that subjects with normal vestibular function demonstrate an eyeball counterroll which is a function of angular velocity and position with respect to the vertical. Subjects with known vestibular defects demonstrate a small counterroll. (Author)

A66-30874**EXTRATERRESTRIAL BIOLOGY.**

R. S. Young (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

New York, Holt, Rinehart and Winston, Inc., 1966. 119 p. \$2.95.

This text is a study of the biological aspects of the extraterrestrial environment and of what they can contribute to the understanding

of life and its processes. An outline of the phenomenon of life includes discussions of plant and animal cells, the hereditary mechanism, and adaptation and evolution. The evolution of elemental life is considered, and the possibility of the existence of organic matter on other planets is considered. Life detection techniques and equipment for detecting life on other planets are described, and attempts to find life in extraterrestrial matter are discussed. Techniques of determining the presence of intelligent life on other planets are explained, and the effects of spaceflight on animals and other living matter is evaluated. B.B.

A66-30952**VISUAL SIMULATION FOR AIRCRAFT AND SPACE FLIGHT TRAINERS.**

P. M. Carey (Central Dynamics, Ltd., Montreal, Canada).

(Institution of Electronic and Radio Engineers, Quebec Section, Meeting, Montreal, Canada, Feb. 2, 1965, Lecture.)

Institution of Electronic and Radio Engineers, Proceedings, vol. 4, Mar.-Apr. 1966, p. 61-69. 10 refs.

This paper outlines the newly emergent technology of visual simulation. The purpose of such a device is to create a synthetic visual reproduction of an external environment and display a dynamic perspective picture to a pilot in a ground-based flight trainer. Visual simulator design must consider three often unrelated disciplines, namely electronics, optics, and psychology. The paper outlines the factors influencing the field of visual simulation and some of the design concepts. It also indicates the current state of the art and postulates future developments. (Author)

A66-30984 #**INPUT POWER DETERMINED FROM TEMPERATURES IN SIMULATED SKIN PROTECTED AGAINST THERMAL RADIATION.**

J. M. Davies (U.S. Army, Natick Laboratories, Pioneering Research Div., Natick, Mass.).

(American Society of Mechanical Engineers and American Institute of Chemical Engineers, Heat Transfer Conference and Exhibit, Los Angeles, Calif., Aug. 8-11, 1965, Paper 65-HT-33.)

ASME, Transactions, Series C - Journal of Heat Transfer, vol. 88, May 1966, p. 154-159; Discussion, J. V. Beck (Michigan State University, East Lansing, Mich.), p. 159; Author's Closure, p. 159, 160. 17 refs.

[For abstract see issue 05, page 627, Accession no. A66-14749]

A66-31119**CINERADIOGRAPHIC OBSERVATIONS OF HUMAN SUBJECTS DURING TRANSVERSE ACCELERATIONS OF $+5G_x$ AND $+10G_x$.**

Harold Sandler (NASA, Ames Research Center, Moffett Field, Calif.).

(Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.)

Aerospace Medicine, vol. 37, May 1966, p. 445-448. 16 refs.

X-ray motion pictures were recorded for five human subjects during transverse accelerations of $+5G_x$ and $+10G_x$ on the Johnsville centrifuge. Quantitative measurements of change in A-P chest diameter and heart position were made from photographic prints of the films. A slight but significant posterior displacement of heart position could be demonstrated when compared to change in the A-P chest diameter. (Author)

A66-31120 #**OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 mm. Hg TOTAL PRESSURE. I - CLINICAL.**

Howard J. Zeft, Frode Ulvedal, E. G. Shaw, B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.), Victor S. Behar (Duke University, Medical Center, Durham, N.C.), and David G. Quigley (Rhode Island Hospital, Providence, R.I.).

Aerospace Medicine, vol. 37, May 1966, p. 449-453. 28 refs. NASA-supported research.

The effects of a 15-day exposure to an environment with a PO_2 of 165.4 mm Hg and a P_{He} of 205.5 mm Hg at 379.9 mm Hg

total pressure have been studied in four men. Initially, all developed conjunctivitis associated with decreased relative humidity which cleared by increasing water vapor pressure. One individual was removed from the chamber prior to completion of the experiment because of the unrelated development of an acute prostatitis. No hematologic, electrolyte, or liver function abnormalities were noted. Stress testing showed some deconditioning from confinement. From this limited study, there appears to be no medical contraindication to the use of this environment for future space cabin atmospheres. (Author)

A66-31121 #

OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 mm. Hg TOTAL PRESSURE. II - RESPIRATORY. W. G. Robertson, H. J. Zeff, B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.), and V. S. Behar (Duke University, Medical Center, Durham, N.C.). Aerospace Medicine, vol. 37, May 1966, p. 453-456. 19 refs. NASA-supported research.

The pulmonary effects of a 2-week exposure to a helium-oxygen atmosphere at a total pressure of 380 mm Hg were evaluated in four healthy young men. Oxygen consumption, carbon dioxide production, alveolar ventilation, dead space, and alveolar gas tensions were determined. The various lung compartments including residual volumes were measured. In addition, vital capacities and maximum breathing capacities were studied. Carbon monoxide diffusing capacities were measured just prior to exposure to the oxygen-helium atmosphere and immediately upon descent from altitude. All other studies were carried out during a 14-day preexperimental control period, 15-day experimental exposure, and a 6-day postexperimental period. Results are discussed with reference to the physical characteristics of helium. An analysis of the effects of the decreased density of the inspired gas mixture is presented. (Author)

A66-31122 #

OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 mm. Hg TOTAL PRESSURE. III - HEAT EXCHANGE. W. L. Epperson (USAF, Williams AFB, Ariz.), D. G. Quigley (Rhode Island Hospital, Providence, R.I.), W. G. Robertson, B. E. Welch (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Environmental Systems Branch, Brooks AFB, Tex.), and V. S. Behar (Duke University, Medical Center, Durham, N.C.).

Aerospace Medicine, vol. 37, May 1966, p. 457-462. 17 refs. NASA-supported research.

Four male subjects were exposed to an atmosphere of helium (205.5 mm Hg) and oxygen (165.4 mm Hg) at a pressure of 379.9 mm Hg for a period of two weeks and to an atmosphere of 579.3 mm Hg helium and 159 mm Hg oxygen at 760 mm Hg for one day. Body temperatures, environmental temperatures, body weights, and metabolic heat were determined both at rest and at exercise. From these data the thermal balance of each subject was calculated. Differences in both skin temperatures and heat balance were seen between the experimental environments and ground-level air. In particular, heat loss by convection was increased and heat loss by evaporation was reduced in the 579.3 mm Hg helium condition. A theoretical consideration of convective heat exchange is presented. (Author)

A66-31123

PHYSICAL CONDITIONING VERSUS +G_z TOLERANCE.

Kenneth H. Cooper and Sidney Leverett, Jr. (USAF, Systems Command, Aerospace Medical Div., Wilford Hall Hospital, Aerospace Medical Laboratory, Lackland AFB, Tex.).

Aerospace Medicine, vol. 37, May 1966, p. 462-465. 18 refs.

An attempt was made in this study to determine the effect of endurance training on +G_z tolerance in experienced centrifuge subjects. Eleven subjects were divided into six exercisers and five controls. For three months the exercisers engaged in a daily (5 times a week) progressive running program while the controls were asked to avoid vigorous exercise. Frequently during this period, all eleven subjects were subjected to both rapid onset and gradual onset runs on the USAF School of Aerospace Medicine centrifuge. At the conclusion of the three months, significant differences were

noticed between the exercise and control groups in endurance capacity as indicated by an increase in maximal oxygen consumption. However, no significant difference was noted between the two groups in their ability to tolerate positive Gs during either gradual or rapid onset centrifuge runs. In this study, neither an increase nor a decrease in +G_z tolerance could be correlated with endurance capacity. (Author)

A66-31124

EFFECTS OF LOWER BODY NEGATIVE PRESSURE ON PHYSIOLOGIC CHANGES DUE TO FOUR WEEKS OF HYPOXIC BED REST. Paul M. Stevens, Perry B. Miller, Theodore N. Lynch, Charles A. Gilbert, Robert L. Johnson, and Lawrence E. Lamb (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Internal Medicine Branch, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, May 1966, p. 466-474. 15 refs.

The effects of hypoxia and lower body negative pressure (L.B.N.P.) on blood volume, orthostatic and physical tolerance were studied in 22 subjects maintained at bed rest for 4 weeks at simulated altitudes of 10,000 and 12,000 feet. No significant differences in results were noted between the two altitudes. Hematocrits increased significantly by 7.2%. Plasma volume decreased (610-637 cc) while the calculated red cell mass either increased slightly or remained unchanged (133-89 cc). This suggests that hypoxia prevents the loss in red cell mass, but has no influence on the loss of plasma volume that occurs during bed rest at ground level; furthermore the erythropoietic response to hypoxia seems to be decreased by bed rest. A significant decrease in calculated red cell mass occurred during ambulation following bed rest but not during exposure to L.B.N.P. while at continued bed rest. Exposure to L.B.N.P. during the last 2 days of bed rest replenished plasma volume and prevented subsequent orthostatic intolerance. In response to a given exercise load the heart rate was much higher if the plasma volume was decreased but unchanged if the plasma volume was reexpanded by L.B.N.P. Maximum oxygen consumption was decreased in all subjects following bed rest regardless of their blood volumes. (Author)

A66-31125

AN ON-LINE SYSTEM FOR MEASURING RESPIRATORY PARAMETERS USING A HYBRID ANALOGUE/DIGITAL COMPUTING SYSTEM.

J. Q. Durfee (Baylor University, College of Medicine, Div. of Anesthesia, Houston, Tex.) and M. N. Leeming (Sloan-Kettering Institute for Cancer Research, New York, N.Y.).

(Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.)

Aerospace Medicine, vol. 37, May 1966, p. 474-478. 18 refs. National Institutes of Health Grant No. HE 08186.

Discussion of work begun approximately six years ago by Bellville and Seed on a system to measure various respiratory parameters, using a pneumotachograph together with a strain gage transducer, an IR CO₂ analyzer, and an analog computer with an X-Y plotter readout. The work of Murphy digitalized the system at the sacrifice of much of the direct readout capabilities. The system was then modified so that both digital and direct analog/digital readouts were achieved. The system has proven to be successful in monitoring and instrumentation. Further sophistication and redesign should make it possible to achieve greater capabilities. F. R. L.

A66-31126

A DOSE-EQUATED PHANTOM FOR SPACE RADIATION RESEARCH.

Benton C. Clark and Joseph F. Janni (USAF, Systems Command, Research and Technology Div., Weapons Laboratory, Kirtland AFB, N. Mex.).

Aerospace Medicine, vol. 37, May 1966, p. 479-484. 18 refs.

A rugged dose-equivalent plastic manikin has been fabricated which is suitable for use in spaceflight. This phantom simulates the interaction of all types of radiation with the geometry of the human body, allowing precise experimental measurements of the depth-dose, linear-energy transfer spectrum, and dosage to critical organs. Dosimeter insertion holes are located in important organs

and other appropriate locations within the body. Extensive environmental testing has been done to guarantee the capability of the manikin to withstand the rigors of spaceflight launch and recovery. A complete analysis of the dose equivalency has been performed. The manikin contains every element which composes at least 0.1% of the human body. The interaction characteristics of the manikin are dose-equated to within 15% for neutrons, and within 10% for photons with energies greater than 0.04 Mev. The response is within 1.5% for electrons with energy between 0.05 Mev and 10.0 Mev, less than 1.2% for protons with energy greater than 1.0 Mev, and within 1.2% for alpha particles of energy greater than 5 Mev.

(Author)

A66-31127**"WET" VERSUS "DRY" SUIT APPROACHES TO WATER IMMERSION PROTECTIVE CLOTHING.**

R. F. Goldman, J. R. Breckenridge, E. Reeves, and E. L. Beckman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.).

Aerospace Medicine, vol. 37, May 1966, p. 485-487. 13 refs.

Discussion of immersion protection flight clothing, which can be either a wet-type suit or waterproof dry suit. A waterproofed manikin was used to study the insulative properties of both types of suits in air and also during water immersion. The bulkier characteristics of the dry suit studied provided greater insulation in air than either a 1/4 in. or 3/16 in. unicellular sponge, neoprene wet suit. However, during water immersion, compression of the dry suit by the water reduced the insulation by 75%. The insulation of the wet suits was also reduced, but these suits are less compressible, and thus during water immersion provide significantly more insulation than the dry suit.

F.R.L.

A66-31128**METHOD OF RECORDING BODY TEMPERATURE FOR PROLONGED TIME.**

Donald I. Tepas and Michael A. B. Vianello (Honeywell, Inc., Systems and Research Div., Research Dept., Human Factors Group, St. Paul, Minn.).

(Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.)

Aerospace Medicine, vol. 37, May 1966, p. 488-491. 14 refs. USAF-supported research.

A harness-mounted temperature sensor was developed for prolonged monitoring of human skin temperature. This sensor was 30 in. by 1 in. in size and was mounted in an adjustable harness which held the sensor in close contact with the chest. Temperature measurements, together with concomitant heart rate readings, were recorded from subjects in the course of 48-hr experimental sessions. The harness proved to be a reasonably comfortable item for the subjects to wear. The temperature measures display many of the characteristics associated with standard body temperature recordings, and the heart rate changes obtained agree with the temperature changes recorded. The results suggest that this may be a promising technique for monitoring body temperature changes remotely in the course of extended space travel. Additional parametric research is needed to completely assess this approach.

(Author)

A66-31129**60-DAY EXPOSURE TO ARTIFICIAL ATMOSPHERES.**

Fred N. Zeiner (Denver, University, Dept. of Zoology, Denver, Colo.).

Aerospace Medicine, vol. 37, May 1966, p. 492-494. 12 refs.

Research supported by the Martin Marietta Corp. and the University of Denver; Grant No. NsG-518.

Three laboratory species were subjected to elevated oxygen tensions for 60-day periods, with nitrogen at either high or at minimal levels. No influence of the nitrogen could be detected. At 337 mm oxygen with hamsters and 373 mm with mice there was no increase in mortality, either during the exposure or following return to the normal altitude environment of Denver. Lung damage was seen, however, at the 300 mm level and became more severe as oxygen tension was further increased. Rats are more tolerant of elevated oxygen than are mice or hamsters, no lung changes being detectable at the 300 mm level. It is concluded that

higher oxygen tensions may be withstood, and for longer periods, than previously reported.

(Author)

A66-31130**MODEL FOR THE STUDY OF PSYCHOLOGICAL STRESS.**

Robert J. Wherry, Jr. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).

(Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.)

Aerospace Medicine, vol. 37, May 1966, p. 495-500. 13 refs.

This paper discusses the need for experimentation in anticipatory physical threat stress and offers a model of the determiners of this type of stress. The major determiners are postulated to be the perceived probability of the occurrence of an unpleasant event, the perceived proximity of the event, and the perceived unpleasantness associated with the occurrence of the event. The paper discusses various problems associated with conducting laboratory research in this area. Problems discussed include (1) finding events for laboratory use which are threatening but safe and ethically acceptable, (2) the necessity for being able to actively control how a subject perceives the laboratory situation, and (3) the measurement of the effects of stress on behavior.

(Author)

A66-31131**PERFORMANCE OF WATER CONDITIONED SUITS.**

D. R. Burton (Ministry of Aviation, Royal Aircraft Establishment, Human Engineering Div., Farnborough, Hants., England).

Aerospace Medicine, vol. 37, May 1966, p. 500-504.

An engineering assessment of the performance of a water conditioned suit as a heat exchanger has been made in a series of experiments. The experimental data have been reduced, with the aid of a simple theoretical analysis, to an equation which adequately describes the characteristics of the water conditioned suit, and defines its performance limits. The experimental technique required that each subject chose his rate of cooling according to his own comfort preference. Precise predictions of suit inlet temperature and mass flow cannot be made because of the large observed variation in cooling rate chosen by different subjects. Adjustment of the pipe distribution of the present demonstration suit is recommended to improve the cooling patterns.

(Author)

A66-31132**VERTEBRAL FRACTURE IN JET AIRCRAFT ACCIDENTS - A STATISTICAL ANALYSIS FOR THE PERIOD 1959 THROUGH 1963, U.S. NAVY.**

Channing L. Ewing (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).

Aerospace Medicine, vol. 37, May 1966, p. 505-508.

Study of the vertebral fracture rate of U.S. naval aircraft accidents in the fiscal years 1959 to 1963, which showed that the highest rates were found in jet aircraft ejections. The F-3 and TF-9J aircraft with multiple catapult seats had significantly higher ejection fracture rates than all other aircraft seat combinations. The sitting height accommodations of both aircraft are below the 70th percentile, and over 94% of all ejections from both aircraft were through the canopy. The combination of the sitting height disparity between man and aircraft and high through-the-canopy ejection rate appears to be a major factor in the production of vertebral fracture.

F.R.L.

A66-31133**EARLY DIAGNOSIS OF CARDIOVASCULAR DISEASE AMONG AIRCREW.**

H. W. Kirchhoff and E. A. Lauschner (German Air Force, Institute of Aviation Medicine, Ffirsstenfeldbruck, West Germany).

Aerospace Medicine, vol. 37, May 1966, p. 509-514. 8 refs.

Review of work performed by the Institute of Aviation Medicine of the German Air Force on functional tests which seem to be of great help in detecting cardiovascular disease in an early stage. Research methods used included registration of pulse rate and blood pressure, spirometry to indicate a decrease in efficiency, tests under determined hypoxia to detect coronary insufficiency, and combined examinations of cardiac efficiency and of the peripheral cardiovascular and respiratory system as a means of discovering functional disturbances. Therapy is discussed.

F.R.L.

A66-31154**BLOOD-PRESSURE AND HEART-RATE CHANGES IN DOGS DURING HYPOTHALAMIC SELF-STIMULATION.**

Jorge Perez-Cruet (Johns Hopkins University, School of Medicine, Pavlovian Laboratory, Baltimore, Md.), Roger W. McIntire, and Stanley S. Pliskoff (Maryland, University, College Park, Md.). Journal of Comparative and Physiological Psychology, vol. 60, no. 3, 1965, p. 373-381. 17 refs.

U.S. Public Health Service Grant No. HE-06945-02; National Institutes of Health Grant No. FR-00004; Grant No. NSG-520; Contract No. DA-49-193-MD-2288.

Study of the blood pressure (BP) and heart rate (HR) during hypothalamic self-stimulation (HSS) and determination to what extent these cardiovascular components are important in supporting self-stimulation. Four subjects with rewarding hypothalamic placements were trained to self-stimulate when a light was turned on inside a soundproof room. During consecutive periods of lights off with no self-stimulation available and of lights on with self-stimulation available, BP and HR were recorded. HSS was accompanied by increases in systolic and diastolic blood pressures and average HR, mediated via the sympathetic nervous system and obliterated by adrenergic blocking agents. Under curare the BP response to manual hypothalamic stimulation was not changed, but the HR response was diminished, indicating that muscular movements contribute little to BP changes during HSS.

M. F.

A66-31184**RAT RETINAL GANGLION CELLS - RECEPTIVE FIELD ORGANIZATION AND MAINTAINED ACTIVITY.**

Joel E. Brown and J. Aristides Rojas (Massachusetts Institute of Technology, Dept. of Biology and Research Laboratory of Electronics, Cambridge, Mass.). Journal of Neurophysiology, vol. 28, 1965, p. 1073-1090. 31 refs. Research supported by the Bell Telephone Laboratories and the Teagle Foundation; Contracts No. DA-36-039-AMC-03200(E); No. AF 33(615)-1747; NSF Grant No. GP-2495; National Institutes of Health Grants No. MH-04737-05; No. NB-04897-02; Grant No. NSG-496.

Experimental investigation of the receptive field of single retina ganglion cells of the rat. A cell was stimulated by a variety of configurations of moving and stationary stimuli displayed on a screen 16 in. from the eye. The cell responses were recorded with a low-impedance metal microelectrode from the axon of the cell in the optic nerve or tract. Two types of units were found; (1) those having concentrically arranged receptive fields with a central region which responded either to an increase (on) or a decrease (off) of illumination and a surround region which antagonized the responses of the central region, and (2) units with no surround. No other types of receptive fields were found.

M. L.

A66-31187**STIMULUS CODING IN THE COCHLEAR NUCLEUS.**

Nelson Y. S. Kiang, Russell R. Pfeiffer, W. Bruce Warr, and Ann S. N. Backus (Massachusetts Eye and Ear Infirmary, Eaton-Peabody Laboratory of Auditory Physiology, Boston; Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge, Mass.).

(American Otological Society, Annual Meeting, 98th, Colorado Springs, Colo., May 25, 26, 1965, Paper.)

Annals of Otology, Rhinology and Laryngology, vol. 74, June 1965, 23 p. 40 refs.

Contract No. DA-36-039-AMC-03200(E); NSF Grant No. GP-2495; National Institutes of Health Grants No. MH-04737-05; No. NB-01344; Grant No. NSG-496.

Experimental investigation of the cochlear nucleus of the cat in which evidence is examined for the proposition that units in different subdivisions of the cochlear nucleus have characteristically different discharge patterns. The cochlear nucleus is anatomically characterized, and major parts are compared. The experimental methods are detailed. It is concluded that there is little doubt that electrophysiologically distinguishable types of units exist in the cochlear nucleus, and that the findings not only define criteria for identifying certain types of units but also indicate a rough correlation between units of particular types and their location within the cochlear nucleus.

M. L.

A66-31269**VISUAL MONITORING OF MULTI-CHANNEL DISPLAYS.**

J. D. Gould (International Business Machines Corp., Thomas J. Watson Research Center, Yorktown Heights, N. Y.) and A. Schaffer (International Business Machines Corp., Thomas J. Watson Research Center, Behavioral Sciences Group, Yorktown Heights, N. Y.). IEEE Transactions on Human Factors in Electronics, vol. HFE-7, June 1966, p. 69-76. 21 refs.

These studies were concerned with assessing the ability of untrained Ss to monitor alphameric multichannel displays for signals based upon the simultaneous values of all the channels. The number of channels to be monitored (8, 12, 16, or 24), the range of values per channel (2, 4, or 8), and the number of different signals, or critical sequences, to watch for (8, 16, or 24) were varied in three experiments. In Experiment I time between changes in the display was 10 sec, in Experiment II it was 5 sec, and in Experiment III it was 2.5 sec. Experiment I indicated that Ss, when monitoring 8 channels, correctly detected over 95% of the signals. In Experiments I and II, Ss made 80% or more correct detections when watching up to 16 channels. Performance continued to decrease with a further increase in the number of channels to be watched and with a further increase in the rate of display change. Levels per channel were important only when either 16 or more channels were monitored or when the display changed every 2.5 sec. As the number of different critical sequences (signals) for which Ss watched increased, correct responses decreased significantly, although this variable exerted the least effect upon performance.

(Author)

A66-31270**PERFORMANCE OF HUMAN OPERATORS IN A THREE-STATE RELAY CONTROL SYSTEM WITH VELOCITY-AUGMENTED DISPLAYS.**

Richard W. Pew (Michigan, University, Dept. of Psychology, Human Performance Center, Ann Arbor, Mich.).

IEEE Transactions on Human Factors in Electronics, vol. HFE-7, June 1966, p. 77-83. 5 refs.

Contract No. NASr-54(06).

Employment of a one-dimensional three-state relay control task in which human operators served as the active switching and equalization element to compare performance in three display conditions and to derive measures of performance that might prove useful for further development of models of human tracking behavior. Two displays which provided explicit velocity information in the form of a unidimensional error-velocity vector superimposed on a compensatory error display and two-dimensional phase plane display of error velocity vs displacement were shown to enhance learning over that produced by the usual compensatory display of error, but only with the highest value of system gain, 30 cm/sec².

B. B.

A66-31271**COMPENSATORY TRACKING WITH VISUAL AND TACTILE DISPLAYS.**

H. F. Seeley (London, University, Medical School, St. Thomas' Hospital, London, England) and J. C. Bliss (Stanford Research Institute, Menlo Park; Stanford University, Stanford, Calif.).

IEEE Transactions on Human Factors in Electronics, vol. HFE-7, June 1966, p. 84-90. 8 refs.

Contracts No. NAS 2-1679; No. NAS 2-2752.

An investigation has been made into the feasibility of a tactile display for compensatory tracking. Three displays, one continuous and two quantized, were used to compare performance. These consisted of an oscilloscope, a 7 by 7 array of neon lights, and a 7 by 7 array of specially developed airjet stimulators. A variable delay was incorporated into the error-analysis program to determine the value of delay for which the error is a minimum. For all the tested combinations of display gain and command signal bandwidth, the mean-squared error showed a well-defined minimum for an appropriate compensating delay. At these minima, the mean-squared errors for the quantized displays were comparable. The variation of minimum mean-squared error with display gain indicated the importance of directional over magnitude information in tracking with quantized displays.

(Author)

A66-31272**THREE MODELS OF PREVIEW CONTROL.**

Thomas B. Sheridan (Massachusetts Institute of Technology, Dept. of Mechanical Engineering, Cambridge, Mass.).
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, June 1966, p. 91-102. 11 refs.
 Grant No. NSG-107-61.

Discussion of a means to describe and eventually to predict the response of a human or artificially intelligent controller which (1) has a constrained preview of the actual input course and which (2) observes the successive target values as being of nonuniform importance. An example given is remote manipulation of solid objects using artificial sensors and effectors, and three models are considered which characterize constrained preview control better than can conventional transfer function techniques. B.B.

A66-31273**A RE-ANALYSIS OF THE PILOT EYE-MOVEMENT DATA.**

J. W. Senders (Bolt, Beranek, and Newman, Inc., Cambridge, Mass.).
IEEE Transactions on Human Factors in Electronics, vol. HFE-7, June 1966, p. 103-106. 10 refs.
 Contract No. NAS 1-3860.

Analysis of the task of sampling many instruments which are part of a coordinated system, such as an aircraft with its instruments, sensors, and couplings. By recording eye fixations of pilots in a series of flight tests, it was determined how often and for how long the various instruments were viewed in a number of flight conditions. Also identified were the pairs of instruments viewed in successive looks. An attempt is made to establish the degree to which the calculated transition probabilities serve as the basis of instrument panel design and panel layout. Predicted and measured values are compared and major discrepancies noted in an attempt to understand the orderly scanning process, if one exists. B.B.

A66-31383**STRESS AND DIETARY INFLUENCE ON THE DIRECT OXIDATIVE PATHWAY OF CARBOHYDRATE METABOLISM IN THE INTESTINE.**

C. J. Pfeiffer and J. R. Debro (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.).
Archives Internationales de Physiologie et de Biochimie, vol. 74, Feb. 1966, p. 97-105. 29 refs.

Investigation of the activity of a major carbohydrate metabolic pathway, the hexosemonophosphate shunt in the jejunal mucosa of 146 rats by assay of mucosal homogenates for activity of glucose-6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase. Normal animals, animals subjected to a variety of environmental stresses (restraint, pylorus-ligation, starvation, and corticoid injection), and animals subjected to refeeding treatments following starvation were studied. It is concluded from the experiments that the metabolism of glucose in the jejunal mucosa is highly responsive to both environmentally induced stress and refeeding regimens, and it is suggested that metabolic alterations in carbohydrate metabolism of the gut mucosa may play some role, as yet unestablished in the early pathogenesis of mucosal lesions. M.F.

A66-31388**A STUDY OF CERTAIN VISUAL EFFECTS OCCASIONED BY FACTORS OF SO-CALLED GLARE.**

Richard F. Haines (Michigan State University, Dept. of Psychology, East Lansing, Mich.; NASA, Ames Research Center, Moffett Field, Calif.) and S. Howard Bartley (Michigan State University, Dept. of Psychology, East Lansing, Mich.).
Journal of Psychology, vol. 62, 1966, p. 255-266. 17 refs.

Study aimed at resolving some questions about the effect of intense photic sources of small visual angular subtense in otherwise unilluminated fields, such as small, bright objects in a moonless sky. The specific problem considered is how the distribution of photic flux from two targets - a stationary fixated one and a less intense moving target that moves toward the fixated target in the frontal plane and passes behind it - will affect the observation of the moving target. The method and procedure are described in detail. A small target moving in the frontal plane was made to disappear and reappear by passing it behind a larger fixed target of much greater luminance. The angular positions at which this disappearance and reappearance occurred were measured. Three

levels of intensity for the fixed retinal image were used and the positions of disappearance and reappearance were different for each, in the way expected.

M.F.

A66-31399**BIOCHEMICAL ASPECTS OF RAPID EYE MOVEMENT SLEEP.**

Arnold J. Mandell and Mary P. Mandell (California, University, Health Science Center, Dept. of Psychiatry, Los Angeles, Calif.).
 (American Psychiatric Association, Annual Meeting, 121st, New York, N.Y., May 3-7, 1965, Paper.)
American Journal of Psychiatry, vol. 122, Oct. 1965, p. 391-401. 53 refs.

Grant No. NSG-237-62.

Review of different biochemical experiments attempting to explain rapid eye movement sleep (REMS). The results of experiments implicating cholinergic mechanisms in REMS, aliphatic or hydroxy acids and aromatic amines in sleep and REMS, as well as experiments relating hormonal variables to sleep and REMS are tabulated. Studies of the biochemical and metabolic correlates of REMS are also tabulated. The urine volume per minute and the urine osmolarity during REM sleep are plotted. Another consistent finding has been an increase in total urinary 17-hydroxycorticoids toward the end or following the REM period. It is noted that this stereotyped, objective, repeatable REMS phenomenon represents a real methodological breakthrough to those interested in metabolic correlates of central nervous system states. M.F.

A66-31413**A CLASSIFICATION OF INFORMATION DISPLAY.**

John K. Bates (International Business Machines Corp., Federal Systems Div., Electronics Systems Center, Owego, N.Y.).
Information Display, vol. 3, Mar.-Apr. 1966, p. 47-51.

Analysis of information display systems based on the modes by which information is received from a system by the human operator through his vision, hearing, and sense of touch. A means of classifying all types of information displays is presented based on the fundamental dimensional variations by which information-bearing energy or mass is perceived by the human sensory system. It is found that there are 16 basic categories of display generation for each sensual mode of visual, aural, or tactile perception. The method was devised to overcome the artificialities which seem to follow classifications methods based on techniques, applications, characteristics, etc. As an illustration, a number of display methods are tabulated, and it is observed that there are potential modes of information transfer which do not seem to have been explored. M.L.

A66-31589 #**INVESTIGATION OF THE OPTIMUM TEMPERATURE CONDITIONS OF THE THERMOPHILIC STRAIN OF CHLORELLA [ISSLEDOVANIIE OPTIMAL'NYKH TEMPERATURNYKH REZHIMOV TERMOFIL'NOGO SHTAMMA KHILORELLY].**

I. V. Smirnov.

Akademiia Nauk SSSR, Doklady, vol. 167, Apr. 21, 1966, p. 1405-1408. 12 refs. In Russian.

Experimental determination of the optimum temperature conditions for cultivating thermophilic strains of chlorella under various radiant flux intensities. It is found that the temperature that corresponds to the maximum growth rate of the culture increases with increasing flux intensity. An empirical formula describing this dependence is derived. V.P.

A66-31745**THE PHOTOCHEMICAL ORIGIN OF LIFE.**

A. Dauvillier (Observatoire du Pic-du-Midi, Laboratoire de Physique Cosmique, Bagnères-de-Bigorre, Hautes-Pyrénées, France).
 (Translation of L'Origine Photochimique de la Vie, Paris, Masson et Compagnie, 1958).
 New York, Academic Press, Inc., 1965. 193 p. \$7.50.

This book is an attempt to explain the origin of life as an interdisciplinary problem of cosmic physics involving astronomy, geophysics, and geochemistry. It is shown that cosmic paleoecanism plays an important role by bringing about the pyrogenetic synthesis of numerous heterocyclic compounds; after condensation

A66-31806

of the oceans, photochemical reactions occurred that were capable of creating the optical rotation characteristic of living matter. Topics discussed include the characteristics of living matter, theories of the origin of life, cosmogony and geogeny - dealing in turn with the origin of the earth; the origin of the continents, oceans, and atmosphere; the photochemical synthesis of organic matter; the organization of living matter; the evolution of living creatures; the energetics of the biosphere; the geochemical role of the biosphere; and life in the universe. M. F.

A66-31761

LASER LESIONS - CHANGES IN RETINAL EXCITABILITY.

A. N. Nicholson and M. J. Allwood (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England). Nature, vol. 210, May 7, 1966, p. 637, 638.

Description of experiments on cats to investigate the complex changes following the production of a chorioretinal lesion produced by a pulsed laser beam. The cats were anesthetized by intravenous injection with pentobarbitone-sodium and the right eye enucleated while the pupil of the left eye was fully dilated by an injection of atropine sulfate. Electroretinograms were recorded with a chlorided silver electrode resting on the rim of the cornea; the optic tract potentials were recorded from coaxial electrodes inserted stereotactically. The photic stimulus was generated by a Mazda FA 10 flash tube. Each lesion was produced by a ruby laser with a nominal output of 0.5 joule and pulse duration of 0.5 msec. The changes in the optic tract of the damaged part of the retina indicate localized permanent damage and temporary disorganization of retinoptic mechanisms. D. P. F.

A66-31806

EXPERIMENTAL DETERMINATION OF THE EFFECTIVE THERMAL-RADIATION SURFACE IN HUMANS [DETERMINATION EXPERIMENTALE DE LA SURFACE EFFECTIVE DE RADIATION THERMIQUE CHEZ L'HOMME].

Jean Colin, Yvon Houdas, and Charles Boutelier (Laboratoire de Médecine Aéro-Spatiale, Brétigny-sur-Orge, Essonne, France). Académie des Sciences (Paris), Comptes Rendus, Série D - Sciences Naturelles, vol. 262, no. 18, May 2, 1966, p. 1966-1969. 7 refs. In French.

Semidirect experimental determination of the effective thermal-radiation surface of humans subjected to omnidirectional radiation. It is found that the effective radiation surface of a subject exposed to such radiation corresponds to 0.84 of the total skin surface taken as unity. This value is said to be in agreement with determinations made previously by indirect methods. A. B. K.

LC ENTRIES

A66-81426

SPIKE AND WAVE DISCHARGES DURING STAGES OF SLEEP.

John J. Ross, Laverne C. Johnson, and Richard D. Walter (U.S. Navy Med. Neuropsychiat. Res. Unit, San Diego, Calif. and Calif. U. Med. Center, Dept. of Neurol., Los Angeles). *Archives of Neurology*, vol. 14, Apr. 1966, p. 399-407. 20 refs.

Grant NSF GB-922; Dept. of Navy supported research.

To study the effect of stage of sleep on electroencephalogram (EEG) seizure discharge rate and morphology, spontaneous all-night sleep EEGs were recorded from 13 ambulatory patients with petit mal attacks or grand mal seizures or both whose waking interictal EEG showed bilateral synchronous paroxysmal spike and wave patterns. Most records demonstrated an increase in spike and wave discharge rate at sleep onset with a continued increase through slow wave sleep, and a marked diminution in the discharge rate with onset of 1-REM (rapid eye movement). The presence of rapid eye movements further suppressed the discharge rate. The centrocephalic discharges demonstrated a progressive change in rhythm, regularity, frequency, form, and amplitude as sleep progressed. By the time stage 4 was reached, tracing showed a preponderance of high voltage waves interspersed with numerous spikes and multiple spikes. The morphology of the discharges during 1-REM was similar to that during awake periods. Comparison of the overall pattern of sleep of these patients with nonepileptic subjects revealed no differences, indicating that the discharges had little effect on the normal sleep patterns. There was no augmentation of the behavioral or autonomic correlates of the discharge during sleep.

A66-81427

EFFECTS OF HYPERBARIC OXYGENATION ON CORONARY ARTERY OCCLUSION IN PIGS.

Robert H. Peter, Ronald W. Rau, Robert E. Whalen, Mark L. Entman, and Henry D. McIntosh (Duke U. Med. Center, Dept. of Med., Cardiovascular Lab., Durham, N. C.). *Circulation Research*, vol. 18, Jan. 1966, p. 89-96. 30 refs.

(Grant PHS HE-07896; Council for Tobacco Res.-USA, N. C. and Am. Heart Assn., and Life Insurance Med. Res. Fund supported research.

To evaluate more precisely the possible protective effect of hyperbaric oxygenation in experimental myocardial infarction, gradual occlusion of a coronary artery was produced in pigs. Ameroid constrictors designed to produce complete occlusion within 48 hours were placed on the left anterior descending coronary artery of 24 young farm pigs. Of these, 12 were placed in a hyperbaric chamber at 1.25 atmospheres absolute and allowed to breathe 100% oxygen for a maximum of 32 hours. For control studies, 12 other pigs were handled in a similar manner outside the chamber while breathing air at normal atmospheric pressure. Pigs treated with hyperbaric oxygenation outlived the untreated pigs. Pathological and histochemical studies of the heart revealed that pigs treated with hyperbaric oxygenation had a high incidence of myocardial infarction, whereas only two pigs in the untreated group showed any evidence of myocardial damage. These findings suggest that moderate but prolonged hyperbaric oxygenation

may lengthen life during and after coronary occlusion. This prolongation of life may permit the development of pathologically detectable myocardial infarctions.

A66-81428

ELECTROPHYSIOLOGIC EFFECTS OF ISOPROTERENOL AND BETA BLOCKING AGENTS IN AWAKE DOGS.

Andrew G. Wallace, William G. Troyer, M. Alan Lesage, and Enzo F. Zotti (Duke U. Med. Center, Div. of Thoracic Surg., Dept. of Surg. and Dept. of Med., Durham, N. C.). *Circulation Research*, vol. 18, Feb. 1966, p. 140-148. 18 refs.

Grants AF 41(609)2315, PHS HE-08571-01, 1T1 GM 1238-01, HTS-5369, and 1-K3-HE-19,949-01, and Am. Heart Assn. AHA 64 G 159; Walker P. Inman Fund supported research.

In awake, unrestrained dogs, beta adrenergic stimulation by isoproterenol increased heart rate and enhanced atrioventricular (A-V) conduction with no change of conduction in Purkinje tissue or ventricular activation time. The chronotropic and dromotropic responses to isoproterenol were abolished completely by the adrenergic antagonists, propranolol (0.2 mg./kg.) and pronethalol (2 mg./kg.). Beta adrenergic blockade with propranolol produced no significant change of heart rate, A-V conduction, conduction velocity in Purkinje tissue, or ventricular activation time. In contrast to the above, pronethalol produced tachycardia, enhanced A-V conduction, and prolonged ventricular activation slightly. The tachycardia which followed pronethalol was largely a consequence of vagal inhibition since it could be nearly abolished by prior administration of atropine. Propranolol produced no changes in the refractory period or excitability of atrial muscle. Pronethalol did not alter the excitability of atrial muscle but did prolong the atrial refractory period. These data support the view that cardiac adrenergic activity has little or no influence on conduction in the ventricle, and suggest that the intensity of sympathetic activity in awake, unrestrained dogs is minimal.

A66-81429

PRACTICAL APPLICABILITY OF THE TELE-ELECTROCARDIOGRAPHIC METHOD IN THE STUDY OF HEART FREQUENCY DURING WORK [APPLICABILITA PRATICA DEL METODO TELE-ELETTROCARDIOGRAFICO NELLO STUDIO DELLA FREQUENZA CARDIACA IN LAVORO].

M. Tomasini, A. Grieco, and A. Cardani (Milan U., Clin. del Lavoro "L. Devoto", and I.N.A.I.L., Centro Studi e Ric., Rome, Italy).

Medicina del Lavoro, vol. 57, Jan. 1966, p. 20-27. 21 refs. In Italian.

Under experimental conditions numerous authors found a direct correlation between muscular exercise and cardiac frequency values. Therefore, under identical conditions pulse frequency data can provide information on the degree of work performance. Various methods may be used to determine this index (use of photo-electric pulse counter, cardiometry, electrocardiography), but tele-electrocardiography appears to be the most useful since the subject examined has complete freedom of movement. This method permits the simultaneous transmission via radio of cardiac potentials derived directly on the thorax to an oscilloscope and a register. The technical characteristics of the apparatus and its operation are discussed. Some examples are given of the practical application of tele-electrocardiography during driving, training of athletes, and in steel workers. The results obtained proved satisfactory and especially useful in the evaluation of cardiorespiratory adaptation to various work activities.

A66-81430

ACUTE TETRAMETHYL LEAD AND TRIMETHYL LEAD CHLORIDE POISONING IN THE RAT: HISTOPATHOLOGICAL AND BIOUMORAL OBSERVATIONS [INTOSSICAZIONE ACUTA DA PIOMBO TETRAMETILE E DA CLORURO DI PIOMBO TRIMETILE NEL RATTO: OSSERVAZIONI ISTOPATOLOGICHE E BIOUMORALI].

M. Gherardi and A. Gnudi (Parma U., Ist. di Semeiotica Med., Italy).

Medicina del Lavoro, vol. 57, Jan. 1966, p. 53-59. 9 refs. In Italian.

Rats were poisoned with tetramethyl lead and trimethyl lead chloride by either inhalation or by peritoneal administration. As observed by other authors, rats were scarcely affected by the action of tetramethyl lead, even when inhaled, but became severely poisoned when treated with trimethyl lead chloride. Identical symptoms were produced by the two substances, the difference lying in the various degrees of toxicity, indicating the pathogenetic role played by the trimethyl lead ion. The main blood indices studied during the course of poisoning show no significant variation with respect to normal values, and histological examination of principal organs demonstrated no significant specific changes.

A66-81431

EFFECT OF REPEATED COOLING ON INORGANIC PHOSPHORUS IN THE BLOOD.

Ruzica Genci.

(*Arhiv Bioloških Nauka*, vol. 17, no. 1-2, 1965, p. 1-7. In Serbo-Croatian).

Archives of Biological Sciences, vol. 17, no. 1-2, 1965, p. 5-10. 16 refs. Translation.

The quantity of inorganic phosphorus in rat's blood in euthermia changed very little after repeated hypothermia (5.28-5.57 mg./100 cc.). After single or repeated hypothermia it ranged within the limits 7.5-11.5 mg./100 cc. The greatest percentage increase in the average inorganic phosphorus level was observed at the beginning of the experiment, after the first cooling (83.88%), whereas the increases after the 8th, 15th, and 22nd cooling were similar (53.38%, 54.98%, 47.0%). Certain features of adaptation to hypothermia in the increase of inorganic phosphorus were observed.

A66-81432

THE INFLUENCE OF MANNED SPACE FLIGHT ON CARDIOVASCULAR FUNCTION.

L. E. Lamb (School of Aerospace Med., Brooks AFB, Tex.). *Cardiology*, vol. 48, no. 1, 1966, p. 118-133. 18 refs.

Manned space flight alters cardiovascular function. Confinement and weightlessness cause function changes similar to inactivity, designated as cardiovascular deconditioning. This includes decreased exercise and orthostatic tolerance. The influence of weightlessness as a separate environmental factor cannot yet be determined since manned space flights involve multiple changes in environmental factors which also affect cardiovascular function. Preliminary data and laboratory studies suggest that with a good life support system man can tolerate the weightlessness of space flight for at least one month.

A66-81433

VISUAL SEARCH EXPERIMENT: NOISE PERSISTENCE, ACUITY, RESPONSE TIME.

Ronald A. Erickson (U. S. Naval Ordnance Test Sta., Aviation Ordnance Dept., China Lake, Calif.)

Journal of the Optical Society of America, vol. 56, Apr. 1966, p. 491-498. 14 refs.

This experiment demonstrated the degradation in search performance resulting from a decrease in the frame rate of a static, structured display containing visual noise. The display was produced by projecting moving pictures of the static, structured scene. Television-type visual noise in the scene was obtained by double exposure and special printing of the film. After a 10-sec. search, the probability of detecting the target was 0.94 in the noise-free display, 0.85 in the noisy display simulating 26 frames/sec., and 0.78 in the noisy display simulating 5.2 frames/sec. These results indicate that restricted usefulness of a low-frame-rate, television-type display may be expected in a low signal-to-noise ratio condition. Neither peripheral acuity, foveal acuity, nor eye-dominance scores correlated significantly with search time. There was a significant correlation between response time and search time, which can be attributed to the mental processing and decision time common to both tasks.

A66-81434

DEPTH-DISCRIMINATION THRESHOLDS FOR STATIONARY AND OSCILLATING TARGETS AT VARIOUS LEVELS OF RETINAL ILLUMINANCE.

Alfred Lit and Harlyn D. Hamm (Southern Ill. U., Carbondale).

Journal of the Optical Society of America, vol. 56, Apr. 1966, p. 510-516. 14 refs.

Grants NSF-G24021 and Natl. Inst. of Mental Health MH 06621; Southern Ill. U. supported research.

Equidistance settings were obtained for stationary and oscillating targets presented in "real depth" at scotopic and photopic levels of retinal illuminance. The data were analyzed in terms of the effects of retinal illuminance and target velocity on both the constant and variable errors of the settings. The results show that both stimulus variables have a systematic effect on the stereoscopic threshold: The variability of the settings progressively increases as either the retinal illuminance is decreased or the target velocity is increased. The effects on the constant errors are less systematic: The localization error is smallest for stationary and slowly oscillating targets, particularly at high levels of retinal illuminance. The curves relating stereoscopic threshold angle and level of retinal illuminance for both stationary and oscillating targets exhibit the typical discontinuity predicted by the duplicity theory of vision. The discontinuities occur at progressively higher values of retinal-illuminance level as target velocity is increased, in quantitative agreement with expectations based on the Bunsen-Roscoe-Bloch law. The curves are progressively displaced upward as target velocity is increased. The results are discussed in relation to data obtained in earlier experiments on stereoscopic acuity and on the Pulfrich stereo-phenomenon.

A66-81435

OPTIMUM INTENSITY OF RED ROAD-TRAFFIC SIGNAL LIGHTS FOR NORMAL AND PROTANOPTIC OBSERVERS.

Barry L. Cole and Brian Brown (Melbourne U., Victorian Coll. of Optometry, Australia).

Journal of the Optical Society of America, vol. 56, Apr. 1966, p. 516-522. 12 refs.

Australian Road Res. Board supported research.

Optimum intensities for a red road-traffic signal light were determined for observers with normal and protanopic

color vision. The term optimum intensity is used to mean the intensity necessary to minimize the chance of not seeing the signal and also the time of response. The experimental conditions simulated an 8-in.-diameter signal light viewed from 100 m. against a sky with a luminance of about 1500 ft.-L. Under these conditions the optimum intensity was shown to be at least 83 candles (cd) and preferably 133 cd. Protanopes required about four times this intensity for the particular red filter used. For a sky of 3×10^4 ft.-L. luminance a red signal should have intensity of 160-260 cd. Protanopic drivers would require at least a 600-cd intensity. Surround screens were shown to improve the visibility of a red signal for normal observers only when the intensity of the signal was less than optimum.

A66-81436

ENERGY METABOLISM AND CIRCULATION IN DOGS EXERCISING IN HYPOXIA

J. Piiper, P. Cerretelli, F. Cuttica, and F. Mangili (Milan U., Lab. of Physiol., Italy, and Max Planck Inst. for Exptl. Med., Göttingen, Germany).

Journal of Applied Physiology, vol. 21, July 1966, p. 1143-1149. 18 refs.

Natl. Res. Council of Italy supported research.

The interrelations between aerobic and anaerobic metabolic rates, O_2 transport, and work performance were studied in dogs at rest and running on a treadmill with an incline of 10% at speeds varying from 4 to 16 km./hr., breathing 21, 15, or 11% O_2 . Measured were: O_2 consumption, cardiac output (by the thermodilution method), heart rate, and lactic acid in blood. When air was breathed the O_2 consumption increased up to the highest work level, but with decreased inspired O_2 a maximum O_2 uptake was reached, which was the lower and was attained at a lower work load, the lower the inspired O_2 . As the O_2 consumption reached its maximum, anaerobic energy release, derived from lactate formation, set in. The behavior of the cardiac output and of the heart rate was similar to that of the O_2 uptake, but their maximum values for each O_2 level were reached at lower speeds.

A66-81437

CARDIAC OUTPUT DURING SUBMAXIMAL AND MAXIMAL EXERCISE IN ACTIVE MIDDLE-AGED ATHLETES.

Gunnar Grimby, Nils Johan Nilsson, and Bengt Saltin (Göteborg U., Dept. of Clin. Physiol. and Kungliga Gymnastiska Centralinst., Dept. of Physiol., Stockholm, Sweden).

Journal of Applied Physiology, vol. 21, July 1966, p. 1150-1156. 24 refs.

Swedish Sport Assoc., Res. Comm. and Swedish Natl. Assoc. against Heart and Chest Diseases supported research.

In well-trained middle-aged (45-55 years) athletes, oxygen uptake, cardiac output (dye-dilution technique), heart rate, and arterial blood pressure were determined at rest in the supine and sitting positions, and during submaximal and maximal exercise in the sitting position. The heart volume was measured at rest (prone). The maximal oxygen uptake was 3.56 liters/min. and the maximal cardiac output 26.8 liters/min. The stroke volume was 19% lower at rest supine than during exercise and reached an average maximal value of 163 ml. The relation between maximal stroke volume and heart volume does not differ from what is found in young individuals. The arteriovenous oxygen difference was 45 ml./liter at rest supine, but increased only to 133 ml./liter during maximal exercise. The low arteriovenous oxygen difference seems to be the main limiting factor for the oxygen uptake and might be explained by the relatively low hemoglobin concentration combined with peripheral factors.

A66-81438

HEMODYNAMIC EFFECTS OF CARBOHYDRATE AND PROTEIN MEALS IN MAN: REST AND EXERCISE.

G. R. Dagenais, A. Oriol, and M. McGregor (Roy. Victoria Hosp., Joint Cardiorespirat. Serv. and McGill U., Montreal Children's Hosp., Montreal, Canada).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1157-1162. 28 refs.

Grant Med. Res. Council of Can. MT-1241 and John A. Hartford Found. supported research.

Changes in cardiac output (Q), heart rate (HR), blood pressure (Pb), and oxygen consumption (V_{O_2}) were observed for 4.5 hr. following carbohydrate or protein-rich meals. Observations were made at rest and during light exercise (300 kg.-m./min.). In eight control subjects who fasted for the same length of time there was no change in Pb or HR but there were small increments in Q and V_{O_2} both at rest and exercise during the last 1.5 hr. of study. Eight subjects consumed a protein-rich meal. At rest there were increments of Q (+2.44 liters/min., 46%), systolic Pb (+10 mm. Hg. 9%), and V_{O_2} (+79 ml./min., 31%). These changes were significantly greater than those of the fasting subjects at equivalent times and were maximal from 180 to 270 min. During exercise each parameter was increased by approximately the same quantity. Eight subjects consumed a carbohydrate-rich meal. At rest there were increments of Q (+1.66 liters/min., 34%), systolic Pb (+10 mm. Hg., 9%) and V_{O_2} (+63 ml./min., 22%), but maximal values were reached earlier, (within the first 1.5 hr.). These changes were again significantly greater than those observed in the fasting subjects. The increments which followed carbohydrate ingestion were of comparable magnitude and timing during exercise.

A66-81439

EXERCISE, HYPOPHYSECTOMY, AND SPLEEN WEIGHT.

Charles M. Tipton (Iowa U., Dept. of Phys. Educ., Exercise Physiol. Lab. and Dept. of Physiol. and Biophys., Iowa City), Gerald D. Tharp, and Richard J. Schild.

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1163-1167. 35 refs. Coll. of Med. Res. Fund supported research.

The immediate and delayed effects of exercise upon the weight and the ratio (spleen weight/body weight) of the spleen were investigated in normal, hypophysectomized, hypophysectomized+growth hormone, vagotomized, immunological sympathectomized, and diencephalon-lesioned male rats. Spleen weights and ratios from animals immediately exercised were significantly lower than nonexercised controls. With the exception of the hypophysectomized runners, training had no appreciable influence on these measures. When normal and hypophysectomized animals received exogenous bovine growth hormone, the weight of the spleen was associated with the dosage injected. The hypothesis is presented that the absence of the "restorative influences" from the growth hormone was responsible for the lower weights and ratios associated with the trained hypophysectomized runners.

A66-81440

WORK CAPACITY IN ACUTE EXPOSURES TO ALTITUDE.

D. B. Dill, Loren G. Myhre, E. Earl Phillips, Jr., and Douglas K. Brown (Ind. U., Dept. of Anat. and Physiol., Bloomington). *Journal of Applied Physiology*, vol. 21, Jul. 1966, p. 1168-1176. 16 refs.

Grants PHS CD-00056 and HE 06308.

Four men ranging in age from 19 to 74 were subjects in three Balke tests on the von Döbeln ergometer at each of four pressures, 740, 535, 485, and 455 mm. Hg. the last three pressures being in the altitude chamber without prior acclimatization. The effects of training on altitude performance were

balanced out and, at the same time, training effects were assessed. Observations made included work capacity, V_E max (minute volume of expiratory gas), V_{O_2} max (rate of oxygen consumption), R (respiratory exchange ratio), the time course of heart rate, blood pressure, and V_E in recovery, heart rate and blood pressure were observed for 5 min. Blood was obtained for lactate in the 6th min. of recovery. Taking V_{O_2} max at 740 as 100 the relative values were 90 at 535, 86 at 485, and 81 at 455. V_E max was independent of altitude as was maximum blood pressure. Maximum heart rate was slightly but significantly less at 455 than 740. Lactate was not significantly less at 455 than at 740. It appears that in the first stage of acclimatization in chronic exposures to altitude, performance is inferior to that in acute exposures.

A66-81441

EFFECT OF CHRONIC HYPOXIA ON THE ACTION OF INSULIN IN CARBOHYDRATE METABOLISM.

E. Picón-Reátegui (U. Nacl. Mayor de San Marcos, Fac. de Med., Inst. de Biol. Andina, Lima, Peru)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1177-1180. 23 refs.

Contract AF-41(657)-249

A study of the response to a test dose of exogenous glucagon-free insulin was undertaken in 12 male residents at sea level and in 12 men residing at an altitude of 4,540 m. above sea level. The results of this experiment seem to indicate that long-term exposure to high altitude has no effect on the changes in blood glucose, pyruvate, and lactate brought about by insulin. There is no satisfactory explanation for the different rate of fall in plasma inorganic phosphate and plasma potassium found between the groups after the administration of insulin. Insulin reactions were less frequent in high-altitude residents as compared to its high incidence in those at sea level. Possible reasons for this difference are discussed.

A66-81442

EFFECT OF CHRONIC HYPOXIA ON THE ACTION OF EPINEPHRINE IN CARBOHYDRATE METABOLISM.

E. Picón-Reátegui (U. Nacl. Mayor de San Marcos, Fac. de Med., Inst. de Biol., Lima, Peru).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1181-1184. 23 refs.

Contract AF-41(657)-249

The action of a test dose of epinephrine on some aspects of carbohydrate metabolism was studied in 12 adult men residing at 150 m. above sea level and in 12 residents of an altitude of 4,540 m. The results seem to indicate that chronic exposure to high altitude has not a substantial effect on the glycogenolytic action of epinephrine on the liver. A higher increase in blood lactate suggests that the glycogenolytic action of epinephrine on the muscle may be affected by high-altitude environment. The difference in the rate of increase between the groups was of high significance during the first 30 min. of the experiment. Changes in blood pyruvate, plasma inorganic phosphate, and plasma potassium following the administration of epinephrine were practically the same in both groups of subjects. Chronic exposure to high altitude appeared to suppress the subjective symptoms produced by epinephrine.

A66-81443

ELEVATED PBI, FREE THYROXINE, AND PLASMA PROTEIN CONCENTRATION IN MAN AT HIGH ALTITUDE.

Martin I. Surks (U. S. Army Med. Res. and Nutr. Lab., Physiol. Div., Fitzsimons Gen. Hosp., Denver, Colo.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1185-1190. 23 refs.

Various aspects of thyroxine binding by plasma proteins were studied in eight sea-level residents before, during, and after 28 days exposure to 14,100 ft. altitude. Mean plasma concentration of protein-bound iodine and total protein and the binding capacity of thyroxine-binding globulin were elevated within three days, reached a maximum after nine days, and returned toward low-altitude values between 12-15 days at altitude. They reached control levels within four days after descending to sea level. In spite of an increased intensity of thyroxine binding by plasma proteins, the concentration of plasma free thyroxine was increased at altitude. Since the electrophoretic distribution of plasma proteins was unaltered, plasma dehydration in the initial phase of altitude exposure was concluded to be responsible for most of the observed alterations in thyroxine binding. A decrease in mean binding capacity of thyroxine-binding prealbumin is interpreted to reflect changes in protein synthesis and/or degradation which may also occur in this environment.

A66-81444

EFFECT OF HIGH ALTITUDE ON MAXIMAL WORKING CAPACITY.

K. Klausen, S. Robinson, E. D. Micahel, and L. G. Myhre (Ind. U., Dept. of Anat. and Physiol., Bloomington).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1191-1194. 17 refs.

NASA Grant NSG 408 and Grants PHS AE 06-308-04 and CD 00056-02.

Maximal work capacity was measured on five subjects before, during, and after a 5-week sojourn at an altitude of 3,800 m. A modification of the Balke test was used; the subjects rode a bicycle ergometer to complete exhaustion. On the first day at high altitude maximal values of O_2 uptake, ventilation (STPD), heart rate, and respiratory exchange ratio, obtained during the last minute of work, were lower than at sea level. During the following five weeks at 3,800 m. a further decrease of the maximal heart rate was seen and increases in the average maximal values of ventilation at STPD (14%), O_2 consumption (4%), blood lactate (12%), and work capacity on the ergometer (7%) were observed. Maximal values of O_2 uptake, ventilation, blood lactate, and work capacity were significantly higher upon return to sea level than in the control experiments before ascending to 3,800 m. This increase in maximal work performance is explained as the combined result of the stay at high altitude and the increased physical activity during the stay at high altitude.

A66-81445

LOW DOSES OF ACETAZOLAMIDE TO AID ACCOMMODATION OF MEN TO ALTITUDE.

Stephen M. Cain and James E. Dunn II (USAF School of Aerospace Med., Physiol. Branch, Brooks AFB, Tex.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1195-1200. 12 refs.

Five men were decompressed to a pressure altitude of 4,270 m. after pretreatment with 750 mg. of acetazolamide and, in a separate run, a placebo in a double-blind study. They remained there about six hr. and two sets of measurements, beginning one and three hr. after ascent, were made to compare with a ground-level control. Similarly, six men were decompressed to 4,880 m. where only one set of measurements was made beginning one hr. after ascent. In a third series, three men stayed at 4,270 m. for five days. In the short-term experiments, standard bicarbonate, pH, and alveolar P_{CO_2} were significantly lowered by pretreatment with acetazolamide. Insignificant increases were noted in alveolar P_{O_2} and ventilation. In the five-day experiments similar results were found

on the first day at altitude, but on the second and third days highly significant increases in ventilation and alveolar P_{O_2} were measured when subjects had been pretreated with acetazolamide. On the fourth and fifth days at altitude, all differences between placebo- and acetazolamide-treated subjects had disappeared. Correction of respiratory alkalosis did appear to increase ventilation and alveolar P_{O_2} but the full effect was not seen until the second day at altitude.

A66-81446

ASSESSMENT OF THERMAL STRESS FROM ENERGY BALANCE CONSIDERATIONS.

J. L. H. Sibbons (Sheffield U., Dept. of Geography, Great Britain).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1207-1217. 66 refs.

The problem of evaluating the thermal stress to which the human body is exposed has been examined theoretically using the energy balance approach. In the steady state a solution is obtained for the nude body in terms of a special variable, the equivalent operative temperature related to wall and air temperatures and to the moisture content of the air. This solution is extended under certain restricting conditions to a clothed surface. The total stress is shown to consist of the sum of environmental and metabolic terms. Although the solution obtained is compatible, in the zone of evaporative regulation, with different combinations of skin temperature and humidity, an explicit mean solution for conditions at the skin is obtainable by introducing a formulation given by Hatch. This method leads to the recognition of four distinct steady-state regimes designated as the operative, free evaporation, restricted evaporation, and wet skin regimes in order of increasing severity of heat. Under conditions where equilibrium cannot be permanently maintained the thermal stress is expressible in terms of a standard cooling power related to the rate of heat debt or accumulation in the body.

A66-81447

EFFECTS OF THERMAL TRANSIENTS TO 205°C ON BLOOD COAGULATION AND CLOT LYSIS.

Raymond H. Murray (Ind. U. Cardiopulmonary Lab., Wright-Patterson AFB, Ohio).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1218-1222. 38 refs.

Contract AF 33(616)-8378.

To evaluate the effects on blood coagulation and clot lysis of transient exposures to intense heat, six clothed human subjects were exposed to thermal pulses to 205°C. (400°F.). Wall temperatures rose at a rate of 28°C./min. to the peak temperature and then fell to near 43°C. over an exposure period of 20 min. Blood sampling and tests were carried out before and after the stress. There was no significant change in the tourniquet test, bleeding time, venous clotting time, prothrombin time, total protein, or serum protein electrophoresis. Although prothrombin consumption times remained unchanged by heating when samples were obtained by venipuncture, they fell significantly when obtained through an indwelling catheter. There was significant enhancement of fibrinolytic activity following the heat stress, explaining delayed bleeding episodes following earlier exposures in this environment.

A66-81448

DYNAMIC RESPONSE OF BONE AND MUSCLE TISSUE.

James H. McElhaney (W. Va. U., Dept. of Theor. and Appl. Mech., Biochem. Lab., Morgantown).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1231-1236. 21 refs.

NASA supported research.

That material properties depend on the rate of loading has long been known. The purpose of this experiment was to study the mechanical response of bone and muscle tissue to impacts of varying velocity. An air gun-type testing machine was developed, capable of performing constant velocity compression tests with strain rates up to 4,000/sec. Adjustable stops are provided which allow predetermined strains to be applied to miniature specimens. High-frequency response instrumentation utilizing a piezoelectric load cell and a capacitance displacement transducer was used. Load and displacement histories on various materials including bone, muscle tissue, aluminum, and nylon were measured over a wide range of strain rates. Results are presented in the form of stress-strain diagrams at selected strain rates. A critical velocity was noted for bone in the neighborhood corresponding to a strain rate of 1/sec. A stress, strain, strain-rate surface representation of the data is suggested and similarities between the dynamic response of bone, nylon, and aluminum are noted. The variation of the ultimate strength of bone with strain rate was found to be satisfactorily represented by an exponential.

A66-81449

BRAIN IMPEDANCE MEASUREMENTS BY THE USE OF SMALL BIPOLAR NEEDLE ELECTRODES.

M. N. Shalit and Y. Mahler (Hadassah U. Hosp., Dept. of Neurosurg., Vision Res. Lab., and Electron. Lab., Jerusalem, Israel). *Journal of Applied Physiology*, vol. 21, Jul. 1966, p. 1237-1242. 32 refs.

Joint Res. Fund, Hebrew U.-Hadassah Med. School supported research.

The use of small bipolar needle electrodes for the measurement of the capacitive properties of the brain tissue was found to be unsatisfactory. Electrode polarization effects, acting as parasitic phenomena, are the main obstacle of this method; thus, the values of capacitance obtained do not represent the capacitive properties of the tissue. In order to overcome the above difficulties, a comparison method was employed by which the electrical parameters measured in brain tissue were compared with the values obtained from an electrolyte solution of the same resistance.

A66-81450

FOREARM VASCULAR RESPONSES TO LOWER BODY NEGATIVE PRESSURE AND ORTHOSTASIS.

Charles A. Gilbert and Paul M. Stevens (USAF School of Aerospace Med., Internal Med. Branch, Brooks AFB, Tex.).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1265-1272. 26 refs.

Forearm blood flow, forearm venous tone, and forearm vascular resistance were measured in normal subjects both during 60 mm. Hg supine lower body negative pressure (LBNP) and during upright tilting. Tilting measurements were done while standing passively erect and while hanging with feet and legs dependent. Forearm blood flow was measured with mercury-rubber strain gauges and forearm vascular resistance was calculated as mean arterial blood pressure/forearm blood flow. Venous tone was evaluated by: (1) forearm pressure-volume curves, (2) venous pressure changes in "isolated arms" where the circulation was arrested, (3) changes in pressure in "isolated vein" segments, and (4) volume of blood contained in the forearm at a constant collecting cuff pressure. Forearm blood flow fell and forearm vascular resistance increased during both LBNP and orthostasis. All four measures of venous tone indicated a significant rise during LBNP and upright tilting. No differences were seen in the forearm vascular responses due to passive standing as compared to upright tilting with the feet and legs dependent.

A66-81451

EFFECT OF CARDIAC AND RESPIRATORY CYCLE ON PULMONARY VEIN FLOW, PRESSURE, AND DIAMETER.
Beverly L. Morgan, David H. Dillard, and Warren G. Guntheroth (Washington U. School of Med., Depts. of Pediatrics and Surg., Div. of Pediatric Cardiol., Seattle).

Journal of Applied Physiology, vol. 21, July 1966, p. 1275-1280. 16 refs.

Grant PHS HE 03998-08.

Pulmonary venous flow, pressure, and diameter were recorded in dogs recovered from implantation of monitoring devices. Flow patterns in pulmonary veins were similar to those in venae cavae. Left atrial systole produced a regurgitant wave in flow and an increase in pressure and diameter of the pulmonary vein. Ventricular systole was associated with a rapid increase in venous flow and a decrease in vein diameter; a second, larger increase in flow occurred during ventricular diastole. No consistent pressure pulse accompanied these forward flow pulsations. The usual effect of inspiration was augmentation of venous flow. Positive flow pulses were recorded during ventricular systole from the right pulmonary vein of an animal whose right lung was perfused entirely by the superior venae cavae. It is concluded that attraction into the heart is more important in determining venous flow patterns than transmitted forward flow pulses.

A66-81452

PULMONARY TO ARTERIAL CIRCULATORY TRANSFER FUNCTION: IMPORTANCE IN RESPIRATORY CONTROL.
Ramon L. Lange, James D. Horgan, James T. Botticelli, Theofilos Tsagaris, Robert P. Carlisle, and Hiroshi Kuida (Marquette U., School of Med., Dept. of Med., and Coll. of Eng., Milwaukee, Wis., and Utah U. College of Med., Dept. of Med., Salt Lake City).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1281-1291. 31 refs.

Grants PHS 07388 and 07434 and Wis. Heart Assoc. supported research.

The transfer function between alveolar or pulmonary capillary and the respiratory chemoreceptors is of theoretical importance in the respiratory control system. The effects of pulmonary artery or alveolus to systemic artery passage on the dispersion of diffusible and nondiffusible indicators were considered to approximate alveolar to chemoreceptor transit. Two methods were employed: (a) preformed curves applying venous injection and pulmonary artery (PA) and femoral arterial (FA) recording or alveolar P_{O_2} was altered and Pa_{O_2} was recorded; (b) slug injection into the PA with FA recording. In studies from normal subjects, humans with heart disease, and dogs, the transfer function from method B indicated a much greater dispersion of indicator than by method A and suggested that slug injection did not approach a unit impulse input. When controlled respiration was employed, similar results were obtained. These findings indicate that alveolar to arterial passage is characterized by rather small temporal distribution of transit times about the mean time, particularly in human studies. The distribution of transit times was expressed as a transfer function. When transfer function representative of various circulatory disorders was incorporated into a schema of the integrated respiratory control system, the transfer function led to stability except when the mean transit time was three to four times normal.

A66-81453

RELATION OF PULMONARY VASCULAR VOLUME TO RESISTANCE: CHANGES WITH MATURATION.

Ronald J. Krone, Maria Gumbinas, and Donald J. Ferguson (Chicago U., School of Med. Dept. of Surg., Ill.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1306-1308. 11 refs.

Grant PHS HE-06010-04.

Pulmonary blood flow relative to vascular volume, body weight, and surface area was measured in the left lower lobes of pups up to 4 months of age and compared to that in full-grown dogs. Flow and pressure were temporarily increased during the measurements by occlusion of the right pulmonary artery. Pulmonary vascular resistance did not change significantly in either pups or adults. Measurements of vascular volume suggest that the pulmonary vessels of the pups are as distensible as those of the adult over the range of pressures measured. Comparison of hemodynamic data in pups and adults did not appear to be improved by using vascular volume as a size factor in place of body weight or surface area.

A66-81454

ABSENCE OF BLOOD-BRAIN POTENTIAL FLUCTUATIONS AT THE RESPIRATORY FREQUENCY.

William F. Raub and William S. Yamamoto (Pa. U., School of Med., Dept. of Physiol., Philadelphia).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1309-1314. 11 refs.

Grant NSF 18483.

The blood-brain potential difference (PD) is the electrical potential difference between the brain extracellular fluid and the arterial blood. Simultaneous records of blood-brain PD and tracheal airflow were obtained from rats during three ventilatory states: (1) eupnea, (2) hyperpnea induced by CO_2 inhalation, and (3) hyperpnea induced by intravenous CO_2 loading. Correlation functions and power density spectra computed for these records demonstrate that the blood-brain PD time series lacks a substantial sinusoidal component with a frequency equal to the average frequency of the respiratory cycle. These results indicate that appreciable intrabreath fluctuations of the PD do not occur during normal breathing. Since the blood-brain PD may be an electrical correlate of arterial pH in the respiratory frequency range of the rat, the implications of the present findings with regard to the nature of the arterial pH time series and to its possible role as a signal for the regulation of respiration are discussed.

A66-81455

ALVEOLAR DIMENSIONS IN THE LUNGS OF ANIMALS RAISED AT HIGH ALTITUDE.

S. M. Tenney and J. E. Remmers (Dartmouth Med. School, Dept. of Physiol., Hanover, N. H.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1328-1330. 15 refs.

Grant Natl. Heart Inst. HE-2888-08

In mammals the diffusing surface area per unit of lung volume correlates interspecifically with rate of resting oxygen consumption. The ratio of oxygen flow-to-pulmonary surface area is a constant over a wide range of body size. Chronic environmental hypoxic stress introduces a diffusion handicap for the lung, and the question arises whether natural selection would lead, intraspecifically, to a change of alveolar dimensions and surface-volume relations of the lungs which would increase pulmonary diffusing capacity over usual sea-level values. The lungs of a high-altitude population of guinea pigs and of domestic sheep were compared with lungs from equivalent populations raised at sea level. The lungs of one llama were compared with lungs of sea-level mammals of comparable body size. No significant morphologic differences between the

high-altitude and sea-level groups were demonstrable. Apparently, endogenous metabolic need is not comparable to exogenous oxygen want on the growth factors which determine alveolar dimensions and, by inference, on maximal pulmonary diffusing surface area.

A66-81456

EFFECTS OF V_A AND V_A/Q DISTRIBUTION AND OF TIME ON THE ALVEOLAR PLATEAU.

R. Sikand, P. Cerretelli, and L. E. Farhi (State U. of New York at Buffalo, School of Med., Dept. of Physiol.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1331-1337. 13 refs.

Contract AF 33(615)-1095 and Grant PHS H-722466V

These studies were undertaken in order to determine whether the changes in expired gas composition during the course of a single prolonged expiration are due to a difference in the time spent by the gas in the lungs or to uneven distribution of inspired gas and/or of ventilation-perfusion ratios. Insofar as the fraction of an inert gas (such as nitrogen when breathing air) is affected by the O_2 and CO_2 exchange, the ventilation effects (V_A/V_A) were studied using argon in the inspired gas as a tracer. Although both A and N_2 are individually affected by alveolar gas exchange, their ratio is not, thus providing an index of distribution of ventilation. The relative contribution of various zones of the lung to expire gas remains constant throughout expiration. Therefore changes in expired O_2 and CO_2 composition are due to a difference in the time spent in the lung. The results lead to the belief that in normal man only the central part of the respiratory units is ventilated by bulk flow, while gas in the peripheral areas is renewed only by diffusion.

A66-81457

ESTIMATION OF TRUE VENOUS AND ARTERIAL P_{CO_2} BY GAS ANALYSIS OF A SINGLE BREATH.

T. S. Kim, H. Rahn, and L. E. Farhi (State U. of New York at Buffalo, School of Med., Dept. of Physiol.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1338-1334. 16 refs.

This method is based on the O_2 and CO_2 analyses of several gas samples collected successively during a single expiration lasting about 10 sec. During that period the alveolar O_2 decreases at a fairly constant rate, while the rate of increase in CO_2 drops progressively. The R at which blood passing through the lungs exchanges is given by the relationship between the rate of CO_2 increase and the rate of O_2 decrease, measured at that time. This "instantaneous gas exchange ratio" falls rapidly. The linear relationship between CO_2 pressure (P_{CO_2}) and this instantaneous respiratory exchange ratio (R), which drops from 0.9 to 0.2 during a single prolonged expiration, is established in each experiment. The true mixed venous P_{CO_2} is the interpolated value read at $R=0.32$, where arterial (alveolar) and venous P_{CO_2} are equal by virtue of the Haldane effect. The mean alveolar P_{CO_2} is determined by the R obtained from an expired gas analysis prior to the exhalation maneuver. From the CO_2 tensions in arterial and venous blood, the CO_2 dissociation curve, and the gas exchange of the subject, the cardiac output can be computed.

A66-81458

READJUSTMENTS IN CARDIAC OUTPUT AND GAS EXCHANGE DURING ONSET OF EXERCISE AND RECOVERY.

P. Cerretelli, R. Sikand and L. E. Farhi (State U. of New York at Buffalo, School of Med., Dept. of Physiol.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1345-1350. 15 refs.

Contract AF 33(615)-1095 and Grant PHS H-7229.

Muscular exercise is characterized by an increase in O_2 uptake and CO_2 output, and by increases in ventilation and cardiac output. This study was conducted in order to determine the rate at which these four functions readjust during onset of exercise and recovery and how the arterial and venous blood gases are effected. The subjects exercised on a treadmill and the various variables were measured at frequent intervals, the cardiac output being determined by a modification of Kim's technique. When expressed in relation to the over-all steady-state change, the rate of change of the four functions considered (VCO_2 , VO_2 , VE , and Q) was found to be independent of the work load. Changes in oxygen flow (VO_2) were more rapid than changes in carbon dioxide flow (VCO_2). The changes in flow of expired gas (VE) were rapid at first, exceeding the rate of change in gas exchange, and later paralleled the changes in VCO_2 . Similarly, cardiac output (Q) exhibited a rapid initial change which decreased later. Since the initial phase was more rapid than the metabolic changes, the readjustment in cardiac output at the onset of exercise must be under neurogenic influence.

A66-81459

ROLE OF NERVE PATHWAYS IN THE HYPOXIC VASOCONSTRICTION OF LUNG.

Thomas C. Lloyd, Jr. (Western Reserve U., School of Med., Dept. of Physiol., Cleveland, Ohio).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1351-1355. 12 refs. Heart Assoc. of Northeast Ohio and Ohio Tuberculosis and Health Assoc. supported research.

In an earlier paper the author offered support for the postulation of a reflex mechanism causing hypoxic pulmonary vasoconstriction. Using similar excised lobe techniques, but with the addition of electrical stimulation of the autonomic nerves at the hilum, it was possible to differentially suppress hypoxic and neurogenic vasoconstriction by several maneuvers. The latter include hypothermia, pH alteration, short periods of anoxia, local anesthetics, and sympatholytic drugs. The differential suppression of hypoxic and neurogenic vasoconstriction implies that hypoxic pulmonary vasoconstriction is a response not mediated along nerve pathways.

A66-81460

ARTERIAL-ALVEOLAR DIFFERENCE IN P_{CO_2} DURING AIR AND OXYGEN BREATHING.

C. Lenfant (Wash. U., Inst. of Respirat. Physiol., Firland Sanatorium, and Depts. of Physiol. and Med., Seattle).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1356-1362. 22 refs.

Grants Natl. Heart Inst. H-08465 and H-1892.

The mean arterial-alveolar difference in CO_2 pressure (P_{CO_2}) was found to be higher during O_2 breathing than during air breathing in 62 subjects breathing successively both gases in a random order. This increase resulted from a change in alveolar CO_2 tension (PA_{CO_2}) and arterial CO_2 tension (Pa_{CO_2}). PA_{CO_2} decreased in all subjects independently of the PA_{CO_2} value during air breathing. Pa_{CO_2} increased proportionally to its value during room-air breathing. The increase of Pa_{CO_2} - PA_{CO_2} is discussed in terms of Haldane effect and in terms of redistribution of ventilation-to-perfusion ratios throughout the lung during O_2 breathing. It is concluded that the Haldane effect, although always present, plays only a minor role, leading to a moderate increase of Pa_{CO_2} , unless the arterial oxygen saturation was quite low during air breathing. Changes in ventilation-to-perfusion ratios distribution secondary to a shift of blood flow during O_2 breathing are an important factor to increase Pa_{CO_2} - PA_{CO_2} . They affect significantly both Pa_{CO_2}

and PA_{CO_2} , but more the latter than the former. Any increase in ventilation, as occurred in these experiments, during O_2 breathing tends to increase the arterial alveolar difference in P_{CO_2} .

A66-81461

POST HYPERVENTILATION APNEA IN AWAKE DOGS DURING METABOLIC ACIDOSIS AND HYPOXIA.

R. A. Mitchell, C. R. Bainton, and G. Edelist (Calif. U., San Francisco Med. Center, Cardiovascular Res. Inst. and Dept. of Anesthesia, San Francisco).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1363-1367. 28 refs.

Grants PHS HE-06285, 5-K3-HE-19, 411-02, 5T1-GM-63-07, and GM-05881.

The ventilatory response to lowered CO_2 pressure (PCO_2) (following mechanical hyperventilation) and to elevated PCO_2 were studied in three dogs with permanent tracheostomies and carotid artery loops. Apnea was invariably obtained following hyperventilation, even in the presence of a base deficit of 9.2 mEq/liter (NH_4Cl by mouth 12-16 g. four-five times daily for 3-5 days) or acute hypoxia (PA_{O_2} 45 mm. Hg for 10 min.). The role of the vagus was excluded by showing that after brief, rapid, shallow hyperventilation, a few breaths preceded apnea. The resting alveolar O_2 tension (PA_{O_2}) fell from a control of 37.0 to 30.7 after 10 min. of hypoxia, and to 32.6 after 3-5 days of acidosis (average pH 7.32 when studied). The CO_2 response curve slope increased from the control of 1.49 liters/min. per mm. Hg PCO_2 with PA_{O_2} 250-300 mm. Hg, to 2.02 during hypoxia but was 1.50 during acidosis. The PCO_2 at the "apneic threshold," determined by steady-state mild hyperventilation, fell from a control of 34.4 to 28.1 during hypoxia and to 29.2 with acidosis. Both posthyperventilation apnea and the shift of the apneic threshold with hypoxia and acidosis appear to be more readily demonstrated in the dog than in man.

A66-81462

DETERMINATION OF BLOOD CARBON MONOXIDE CONTENT BY GAS CHROMATOGRAPHY.

Stephen M. Ayres, Antonette Criscitiello and Stanley Giannelli, Jr. (St. Vincent's Hosp., Cardiopulmonary Lab. and N.Y.U., Med. Center and Dept. of Med. and Surg., New York City).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1368-1370. 7 refs.

Grant Health Res. Council, New York City U1431 and Council for Tobacco Res. supported research.

Small amounts of blood CO were measured by gas chromatography following vacuum extraction in a Van Slyke manometric apparatus. The coefficient of variation for 23 consecutive duplicate determinations on blood samples containing 0.0113-2.3830 ml./100 ml. averaged 1.95%. The method equals the precision of previously described techniques, is specific for CO, and is relatively simple to perform.

A66-81463

DIGITAL COMPUTER SUBROUTINE FOR THE CONVERSION OF OXYGEN TENSION INTO SATURATION.

G. Richard Kelman (Leeds U., Dept. of Anaesthesia, Great Britain).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1375-1376. 8 refs. Med. Res. Council, Great Britain supported research.

A digital computer subroutine for the conversion of oxygen tension to saturation at various temperatures, carbon dioxide

tensions, and hydrogen ion concentrations is described. It is based on a mathematical model of the dissociation curve, similar to that proposed by Adair, applicable to a temperature of 37°C. and normal acid-base state, and corrections which make this model applicable to other temperatures and acid-base states. This subroutine is self-contained and is ready for inclusion in larger programs without modification.

A66-81464

DETERMINATION OF CARBON DIOXIDE CONTENT OF BLOOD BY INFRARED ANALYSIS.

F. Gimeno Ortega, S. A. M. Orie, and G. J. Tammeling (State U., Med. Dept., Pulmonary Div., Groningen, The Netherlands). *Journal of Applied Physiology*, vol. 21, Jul. 1966, p. 1377-1380. 14 refs. Netherlands Organ. for Health Res. T. N. O. supported research.

This paper deals with an adaptation of an infrared analyzer for the determination of the carbon dioxide content of blood. The apparatus was tested with various carbon dioxide tensions and the results were compared with those obtained with the conventional Van Slyke-Neill technique. The reproducibility of the infrared method is better than that of the Van Slyke-Neill method under comparable operating conditions. The infrared method requires practically no skill. A complete analysis can be performed within 5 min. The main disadvantage of the method is its limitation to carbon dioxide. It should not be used when anesthetic gases are present.

A66-81465

A COMPARISON OF MAXIMAL OXYGEN UPTAKE BY TREADMILL AND STEP-TEST PROCEDURES.

F. W. Kasch, W. H. Phillips, W. D. Ross, J. E. L. Carter, and J. L. Boyer (San Diego State Coll., Phys. Educ. Res. Lab., Calif.) *Journal of Applied Physiology*, vol. 21, Jul. 1966, p. 1387-1388. 6 refs.

Estimations of maximal oxygen uptake by a treadmill and step-test procedure were obtained on 12 subjects within a 7-day period. Expressed in milliliters per minute per kilogram STPD, treadmill values ranged from 40.2 to 54.1, with a mean of 48.3 and a standard deviation of 4.5. The step-test values ranged from 37.2 to 56.0, with a mean of 48.0 and a standard deviation of 5.1 ml./min. per kg. STPD. The coefficient of correlation between treadmill and step-test scores was +.95. From this and a negligible difference of means of 0.24 ml./min. per kg. the results of the two procedures were practically identical. Test-retest by five subjects using the step-test procedure showed a mean difference favoring the second test of 1.5, with a greatest difference of 1.6 ml./min. per kg. Because of its apparent reliability, economy, safety, and versatility in accommodating a wide age range of normal and impaired subjects, the step-test procedure is preferred.

A66-81466

AN ANALOG COMPUTER PROGRAM AND ASSOCIATED CIRCUITRY FOR VENTILATORY CALCULATIONS.

Howard T. Milhorn, Jr. and Konrad W. Scheel (Miss. U., Med. Center, Dept. of Physiol. and Biophys., Biomed. Eng. Sect. Jackson).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1389-1392. NIH supported research.

An analog computer program and the associated circuitry necessary for the breath-by-breath calculation of (1) respiratory airflow rate, (2) tidal volume, (3) respiratory period, (4) minute ventilation, and (5) alveolar ventilation is presented. The airflow rate is picked up from a transducer and used to perform the desired calculations. It is also used to trigger the

integrators in the computer circuit to zero at the beginning of each expiration, thus initiating a new set of calculations for the next breath.

A66-81467

A RAPID METHOD FOR MEASURING BLOOD OXYGEN CONTENT UTILIZING THE OXYGEN ELECTRODE.

Lester B. Mayers and Robert E. Forster (Pa. U., School of Med., Div. of Graduate Med., Dept. of Physiol., Philadelphia).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1393-1396. 10 refs. Life Insurance Med. Res. Fund supported research.

A method is described for measuring blood oxygen content released from hemoglobin by ferricyanide with a membrane-covered oxygen electrode. Degassed ferricyanide solution is allowed to run through a stopcock bore containing the blood sample (0.12 ml.) into a syringe where mixing is accomplished. The oxygen content of the blood sample is calculated from the increase in oxygen tension measured in the blood-ferricyanide mixture. With simultaneous determinations of blood oxygen content by the Van Slyke method and the electrode technique, the average discrepancy is 3.2% (0.37 ml./100 ml.) with the standard deviation of the difference being 4.0% (0.5 ml./100 ml.). One determination can be done in 6 or 7 min. and a high degree of reproducibility attained with small demand on technical facility.

A66-81468

SOLUBILITY OF NITROUS OXIDE IN HUMAN BLOOD.

G. L. Ostiguy and Margaret R. Becklake (McGill U., Roy. Victoria Hosp., Joint Cardiorespirat. Serv., Montreal, Canada). *Journal of Applied Physiology*, vol. 21, Jul. 1966, p. 1397-1399. 14 refs. Defence Res. Board and Med. Res. Council, Canada and John A. Hartford Found. supported research.

The solubility of N_2O in blood was estimated by an extraction method in 24 normal men and 16 normal women aged 17-75 years, in four subjects with thyrotoxicosis, and in four with hyperlipidemia. No significant differences were found between these groups nor was any consistent age trend demonstrable; indeed, intersubject variation was of the same order as technical reproducibility of the method. It can be computed that cardiac output (using the indirect Fick technique with N_2O as the test gas) would vary by only 3.5% in consequence of intersubject variation in the solubility coefficient of N_2O in blood, even if all variability demonstrated here were due to this cause. However, group mean differences due to this cause would be much lower (about 0.1%), indicating that in survey work an assumed value can be used without sacrificing precision.

A66-81469

COMPARISON OF FOOTBOARD AND SADDLE SUPPORTS FOR ORTHOSTATIC TESTS ON A TILT TABLE.

Raymond H. Murray, John A. Bowers, and Evan R. Goltra (Ind. U. Cardiopulmonary Lab., Bloomington and Aerospace Med. Res. Labs., Multienvirom. Div., Wright-Patterson AFB, Ohio). *Journal of Applied Physiology*, vol. 21, Jul. 1966, p. 1409-1411. 10 refs.

Contract AF 33(616)-8378.

Using a standardized protocol controlling environmental, subject, and observer variables, 20 healthy young men were tilted head up to 60° for 20 min. on two occasions to compare the responses using a footboard and a saddle as support devices for the body. By comparing symptoms and changes in heart rate, systolic, diastolic, mean, and pulse pressures, there was no significant difference between the responses to tilting

using these devices. Under the conditions of this study, these two methods can be considered identical tests of cardiovascular response to orthostasis.

A66-81470

A FLEXIBLE LEVER SYSTEM FOR QUANTITATIVE MEASUREMENTS OF MAMMALIAN MUSCLE DYNAMICS.

Alan S. Bahler and John T. Fales (Johns Hopkins U., Dept. of Environ. Med., Baltimore, Md.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1421-1426. 10 refs.

Grants PHS 5-F3-GM-23, 697-02 and AM-05524.

The design of a lever system that is capable of performing a wide range of myometric experiments is described. The system consists of an electromagnetic torque source, lightweight magnesium lever member, direct velocity transducer coil, and force transducer. By regulating the current supplied to the torque source, isometric, isotonic, constant velocity, and quick release-stretch experiments can be performed with the same basic lever system. This flexibility was not found in the conventional lever systems described in the literature. The over-all performance characteristics of this system were shown by experimental data.

A66-81471

A PRECISION CONSTANT WORK-RATE ERGOMETER.

A. R. Atkins and A. Nünlist (Transvaal and Orange Free State Chamber of Mines, Res. Organ., Johannesburg, South Africa).

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1427-1434. 22 refs

A description is given of a new type of bicycle ergometer designed specifically for accurate measurement of low work rates. A specially designed pedal wheel with one spoke to which strain gauges are attached for measuring the input torque ensures that chain and bearing losses are allowed for. An automatically controlled electromagnetic brake ensures that a constant work rate is maintained over a very wide range of speeds.

A66-81472

ISOTONIC AND ISOMETRIC FORCES OF FOREARM FLEXORS AND EXTENSORS.

Mohan Singh and Peter V. Karpovich (Springfield Coll., Physiol. Res. Lab., Mass.)

Journal of Applied Physiology, vol. 21, Jul. 1966, p. 1435-1437. 5 refs.

Grant Natl. Inst. of Arthritis and Metab. Diseases AM 06724-03.

A special electrically operated dynamometer was designed for continuously measuring and recording the maximum effective concentric, eccentric, and isometric forces of forearm flexors and extensors, along with the degrees of the elbow angle. The data thus obtained were used to study the inter-relationship between all of these forces. The eccentric forces of flexors and extensors were 32.65% and 14.22% greater than the concentric forces, respectively. The isometric force of flexors was 41.64% greater than the isometric force of extensors. The eccentric force of extensors was significantly lower than the isometric and concentric force at the elbow angle of 140°. Equations for each force curve were developed.

A66-81473

SELF-STIMULATION IN PIGEONS: THE PROBLEM OF "PRIMING".

Euan M. Macphail (Oxford U., Inst. of Exptl. Psychol., Great Britain).

Psychonomic Science, vol. 5, May 5, 1966, p. 7-8. 5 refs.

Grants AF EOAR 64-2 and PHS MH00647.

In an experiment designed to investigate the roles of deprivation and priming in self-stimulation in pigeons, two of eight birds for which electrical stimulation of the brain (ESB) had previously been shown to be rewarding self-stimulated at good rates irrespective of state of deprivation or priming. The other six birds responded poorly whether satiated, hungry, or thirsty, despite the delivery of externally-paced priming shocks. It is concluded that self-delivered ESB is more effective than externally-paced ESB in initiating self-stimulation; this is taken to be a consequence of the interaction of rewarding and aversive effects of ESB.

A66-81474

LINEAR PATTERN COMPLETION BY CHIMPANZEES.

T. E. Levere (Henry Ford Hosp., Dept. of Neurol. and Psychiat., Detroit, Mich.)

Psychonomic Science, vol. 5, May 5, 1966, p. 15-16.

NASA Grant NASr-83.

Two chimpanzees were trained to complete linear patterns contained within a 4 by 4 stimulus matrix. It was found that the animals were significantly inferior when required to complete diagonal as compared to vertical and horizontal patterns. Rotation of the stimulus matrix 45 degrees decreased this deficiency but failed to equate the rotated displays with their vertical and horizontal controls.

A66-81475

RETENTION OF A POSITION DISCRIMINATION AFTER REGENERATION IN PLANARIANS.

W. C. Corning (Mich. State U., East Lansing).

Psychonomic Science, vol. 5, May 5, 1966, p. 17-18.

NASA Grant NsG 475.

When planarians are trained in a right-left discrimination and then sectioned, both the anterior and posterior portions demonstrate retention of the discrimination after regeneration. In subsequent retraining trials these subjects also require fewer trials to reach criterion than the original subjects. Control groups indicate that the retention levels are comparable to those of trained uncut animals and that regeneration by itself does not facilitate learning.

A66-81476

ON THE EFFECTS OF RADIANT HEAT ON VARIOUS PARTS OF THE HUMAN BODY. II. TIME OF DISAPPEARANCE OF SWEAT AND SKIN TEMPERATURE IN VARIOUS NON-IRRADIATED PARTS OF THE BODY DURING INFRARED IRRADIATION LOCALIZED IN THE FACE AND THORAX OR IN THE ABDOMEN OF SPECIFICALLY ACCLIMATIZED AND NONACCLIMATIZED SUBJECTS [SUGLI EFFETTI DEL CALORE RADIANTE SU REGIONI DIVERSE DEL CORPO UMANO. NOTA 2^a-TEMPO DI COMPARSA DEL SUDORE E TEMPERATURA CUTANEA IN REGIONI DIVERSE DEL CORPO NON IRRADIATE DURANTE IRRADIAZIONE INFRAROSSA LOCALIZZATA AL VOLTO O AL TORACE O ALL'ADDOME IN SOGGETTI SPECIFICAMENTE ACCLIMATATI E NON].

V. Wyss (Torino U., Ist. di Fisiol. Umana, Italy).

Medicina del Lavoro, vol. 57, Jan. 1966, p. 28-43. 15 refs. In Italian.

Comunita Europea del Carbone e dell'Acciaio supported research.

A study was made of the onset of sweat and the cutaneous temperature of the dorsal surface of the foot and hand, middle third of the leg, abdomen, thorax, cheek, forehead, and posterior cervical region during infrared irradiation of the face, anterior thorax, or abdomen in subjects acclimatized to both

high environmental temperatures for several years and to intense infrared radiations, and in non-acclimatized subjects. The heat source was an electric fire with metal spiral at 1040-1060°C., with incidental thermal flux equal to 0.44 Cal./cm²/sec. In acclimatized subjects sweating time was 2.5 to 8 times lower than in those not acclimatized (3-4 minutes on the irradiated area, 5-6 minutes on the dorsal surface of hands and on the face, up to 8 minutes on the trunk and lower limbs). At times sweat appeared on non-irradiated areas (dorsum of hands) before on irradiated regions (thorax). With the onset of sweating, skin temperature in some regions was high or low (trunk) and in others (legs) consistently low. The total skin surface had a lower temperature at the time of sweating than initially, and seemed more extensive in acclimatized than in non-acclimatized subjects. Considering the time of appearance of sweating, its quantitative excess with respect to the amount required for thermal regulation, and the effects of heat adaptation on the sweat mechanisms, it is hypothesized that conditioned reflexes may possibly play a role in integrating the spinal and hypothalamic mechanisms normally responsible for the regulation of sweating.

A66-81477

ARTERIAL OXYGEN SATURATION AND PULMONARY VENTILATION IN DOGS EXPOSED TO +G_x ACCELERATION [COMPORTAMENTO DELLA SATURAZIONE ARTERIOSA IN O₂ E DELLA VENTILAZIONE POLMONARE IN CANI SOTTOPOSTI AD ACCELERAZIONI +G_x].

E. Busnengo, A. Dagianti, F. Rossanigo, and P. Rota (Centro di Studi e Ric. di Med. Aeron. e Spaziale and Ispettorato di Sanita' Aeron., Rome, Italy).

(*Aerospace Med. Panel, AGARD, 12th Meeting, Monaco, Sep. 1-7, 1965*).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jul.-Sep. 1965, p. 263-274. 21 refs. In Italian.

Five dogs under morphine and chloralose anesthesia were subjected to +G_x accelerations ranging from 1 to 8 g constantly for a time varying from 1 to 5 minutes. Altogether 96 experiments were carried out. An arterial desaturation was observed which started at 4 g, the peak being noticed during the first and second minute of exposure, and increased with the increase in the number of g. Upon exposure to 3 g and higher, there occurred an initial phase of apnea which lasted 45 seconds, followed by a phase of hyperventilation which increased progressively with the increase in the number of g, but decreased at the higher values (7 and 8 g). The probable mechanisms regulating the behavior of the physiological parameters examined are discussed, with special emphasis on the importance of reflex regulation and the effect of mechanical factors.

A66-81478

CONSIDERATIONS OF MORPHOLOGICAL AND PHYSIOLOGICAL EVALUATION OF CANDIDATE PILOTS EXPOSED TO RESPIRATORY AND CARDIOVASCULAR FUNCTION TESTS. [ALCUNE CONSIDERAZIONI SULLE VALUTAZIONI MORFO-FISIOLOGICHE IN ASPIRANTI PILOTI SOTTOPOSTI A PROVE DI ESPLORAZIONE FUNZIONALE RESPIRATORIA E CARDIO-CIRCOLATORIA].

V. Correnti and A. Scano (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jul.-Sep. 1965, p. 275-291. In Italian.

The following anthropometric data were recorded from pilot candidates: body weight; height; length of left trochanter; height during sitting; length of arm and upper limb; biachromial

diameter; bicristal diameter; diameter of transverse and sagittal thorax; diameter of sagittal hypochondrium and left humeral bicondylar; inspiratory and expiratory thoracic perimeter; umbilical abdominal perimeter; left contracted arm perimeter; and left anterior and posterior arm adipose tissue. From this data calculations were made of the total four diameters of the trunk, the decreased arm perimeter, and the skeletal and muscular indexes. Studies were also made of the vital capacity (VC), timed vital capacity (TVC) at rest, pulmonary ventilation, oxygen inhalation, and cardiac frequency during severe muscular work (from which TVC/VC, calories/liter, $\dot{V}O_2$ /heart rate ratios were determined). Statistical and graphic analysis of the recorded data showed a characteristic grouping or lacking in extreme cases and therefore were not considered useful in studying correlations among variables of different natures. However, the results indicate a tendency of anthropometric data to be arranged with those of the physiological parameters examined, especially oxygen intake.

A66-81479

ELECTROENCEPHALOGRAPHIC CHANGES IN ALBINO RATS EXPOSED TO SEVERE TANGENTIAL (TRANSVERSE) ACCELERATION BEFORE AND AFTER SPLENECTOMY [VARIAZIONI DELL'ELETTROENCEFALOGRAMMA DI RATTI ALBINI SOTTOPOSTI A FORTI ACCELERAZIONI TRASVERSALI (TANGENZIALI) PRIMA E DOPO LA SPLENECTOMIA].

C. Vacca, L. Vacca, and L. Causa (Naples U., Ist. di Fisiol. Gen. e Spec. degli Animali Domestici e Chim. Biol.; and Aeron. Mil., Ist. Med.-Legale "G. Gradenigo", Naples, Italy).

(Intern. Astron. Federation, XVth Congr., Athens, Sep. 13-18, 1965).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jul.-Sep. 1965, p. 292-301. In Italian.

An electroencephalographic (EEG) recording was made of three leads (right occipital-left occipital, left occipital-left frontal, left frontal-right occipital) from 12 albino rats of both sexes during sound sleep (full resolution of muscular tone) induced by barbituric anesthesia in (1) normal animals and (2) ten days after splenectomy, before, during, and after transverse centrifugal accelerations (right side-left side) ranging from 3.6 and 8.9 g for 90 seconds. EEG changes of frequency, morphology, and voltage observed after splenectomy in basal waves were not clear enough to be considered as significant alterations of nerve cell bioelectric activity. In addition, accelerations did not substantially modify the EEG, except for a slight reduction of general voltage. The latter was the most evident and constant datum observed in normal and splenectomized animals. It is concluded that neither splenectomy ten days after, nor severe transverse accelerations before and after splenectomy, cause substantial EEG variations in the albino rat under sound barbituric anesthesia.

A66-81480

SAMPLING OF AIR-BORNE BACTERIA BY MEANS OF A CASCADE VAULT SAMPLER [IL PRELIEVO PI BATTERI AEROGENI MEDIANTE UN CAMPIONATORE A VOLTA IN CASCATA].

L. Mammarella (Centro Tec. Chim.-Fis. Biol. del Esercito, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Jul.-Sep. 1965, p. 313-326. 5 refs. In Italian.

A cascade vault device is described and illustrated for sampling bacterial aerosols with units of rather large size (about 10 microns and up). Comparative tabulated studies made with the holed disk and cascade disk sampler of the

number of bacterial colonies derived from a series of specimens, and from a series of both 20 and 50 specimens, gave satisfactory results for the cascade vault sampler. The simplicity of the method and apparatus render it very useful in the control of air-borne bacteria.

A66-81481

EFFECTS OF HYPOXIA ON THYROID FUNCTION [EFFETTI DELLA IPOSSIA SULLA FUNZIONE TIROIDEA].

L. Cramarossa, L. Donati, C. Bramati, and F. De Luca (Rome U., Ist. di Patol. Spec. Med. ed. Metodol. Clin.; and Centro di Studie Ric. di Med. Aeron. e Spaziale, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 423-429. 22 refs. In Italian.

Albino rats were subjected to chronic hypoxia in a decompression chamber at 354 mm. Hg (equal to an oxygen pressure of 74 mm. Hg). One group of rats was sacrificed after 20 days, and another group after 40 days of hypoxia and thyroid studies made. This latter group received intraperitoneal radioiodine 24 hours prior to being sacrificed. After 20 days no significant thyroid variations were found in the hypoxic animals. However, after 40 days, a great reduction (34.4%) was found in the thyroid level of I^{131} . Thyroid weight reported at 100 grams of body weight was not significantly changed, but histological examination revealed a great reduction (35.8%) in the height of follicular cells.

A66-81482

ON THE TOPIC OF INJURIES FROM AVIATION ACCIDENTS: CONCERNING FINDINGS ON THE VICTIMS OF THE COMET 4 C "SA-R7" CRASH [IN TEMA DI LESIVITA DA INCIDENTE AEREO. A PROPOSITO DEI REPERTI SULLE VITTIME DELL'INCIDENTE DEL COMET 4 C "SA-R7"].

A. De Bernardi and P. Tappero (Torino U., Ist. di Med. Legale e delle Assicurazioni, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 430-439. 10 refs. In Italian.

Post-mortem examination of victims of the Comet 4 C SA-R7 crash on March 20, 1963, revealed that most persons died as a direct result of an explosion within the aircraft. The bodies were not disintegrated but showed large fragments of amputation of the limbs, parts of the head, etc., and with fraying of the skin and tendons. A lesser degree of fragmentation was evident in bodies found in immediate contact with the source of explosion. A comparative examination is included of post-mortem findings in cases of explosive decompression and precipitation from great heights, with explosion on the ground, and with the findings of the Comet 4 C crash.

A66-81483

CLINICAL AND FORENSIC-MEDICAL CONSIDERATIONS REGARDING A FATAL CASE OF MYOCARDIC INFARCT, WHICH OCCURRED IN FLIGHT TO A MILITARY PILOT [CONSIDERAZIONI CLINICHE E MEDICO-LEGALI SU UN CASO LETALE DI INFARTO MIOCARDICO OCCORSO IN VOLO AD UN PILOTA MILITARE].

G. Rotondo (Milan U., Ist. di Med. Legale e delle Assicurazioni, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 440-452. 24 refs. In Italian.

A case history is reported of a 45-year-old military pilot who suffered a myocardial infarct during flight and died several minutes after landing his T.6 aircraft successfully. Discussion is presented of various etiopathogenetic mechanisms involved in atherosclerotic diseases of flying personnel including the

A66-81484

following: disorders of lipoprotein metabolism; mental tension and emotional stress of flying activity producing variations of blood biochemistry, tachycardia and increased arterial pressure; hemodynamic disorders caused by anoxic anoxia and angular accelerations of high altitude, high speed flight; changes in temperature, humidity, barometric pressure, etc. during flight; and adrenal hyperactivity causing cardiovascular changes. The medicolegal aspects of the described case are considered in regard to the service connection of the disease, and in prevention of aircraft accidents by sudden cardiac or vascular crises in the pilot.

A66-81484

ERYTHROPOIETIN AND POLYGLOBULISM: SOME BIOCHEMICAL AND PHYSIOPATHOLOGICAL DATA [ERITROPOIETINA E POLIGLOBULIE: QUALCHE DATO DI BIOCHIMICA E FISIOPATOLOGIA]

G. Bilancioni (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 28, Oct.-Dec. 1965, p. 453-474. 58 refs. In Italian.

A review is presented of the following fundamental methods used to induce polycythemia in animals: (1) decreasing the tissue oxygen tension indirectly by producing respiratory anoxia while breathing low oxygen mixtures, and directly by inducing histotoxic anoxia; (2) administration of soluble and ionizable cobalt; (3) transfusion of concentrated homologous blood cells; and (4) directly stimulating the hemocytoblasts of the erythropoietic system. Discussed are the relations of these techniques to erythropoietin; characteristics and isolation of plasma erythropoietin; organs secreting erythropoietin; technique of extracting tissue erythropoietin; perfusion of isolated organs and demonstration of the increase in erythropoietic factors; and erythropoietic factors soluble in non-aqueous solvents.

A66-81485

URINARY SULPHATES AS RELATED TO ENVIRONMENTAL POLLUTION IN WORKERS EXPOSED TO BENZENE RISK [SOLFATI URINARI IN RAPPORTO ALL'INQUINAMENTO AMBIENTALE NEGLI OPERAI ESPOSTI A RISCHIO BENZOLICO]

A. Salvadeo, M. Lalli, and L. Benazzo (Pavia U., Ist. di Med. del Lavoro, Italy).

Lavoro Umano, vol. 17, Dec. 1965, p. 599-606. 11 refs. In Italian.

A study was made of the relationship between the urinary elimination of organic sulfates and the degree of environmental benzene pollution in a group of shoe workers. A decrease was found in the inorganic sulfate/total sulfate ratio in practically all workers exposed to benzene concentrations higher than 5 p.p.m. No evidence was found to evaluate, even approximately, the degree of environmental pollution based on the urinary elimination of organic sulfoconjugates. This urine test is considered of value in screening benzene poisoning, although in rare cases it may be individually affected by other factors.

A66-81486

ON THE EFFECTS OF NEGATIVE IONIZATION ON MENTAL ACTIVITY [CIRCA L'INFLUENZA DELLA IONIZZAZIONE NEGATIVA SULL'ATTIVITA MENTALE]

A. Lo Cascio and S. Di Blasi (Palermo U., Ist. di Med. del Lavoro, Italy).

Lavoro Umano, vol. 17, Dec. 1965, p. 611-615. 7 refs. In Italian.

Fifty subjects between 15-45 years of age were exposed for two consecutive days to aptitude and ability tests (speed and precision of mathematical calculations and reconstruction of mosaics) under normal environmental conditions and in a negatively ionized environment. In comparison with other authors who maintain the beneficial influence of negative ionization in the work environment, no significant improvement in mental activity could be attributed to the effects of environmental ionization in this experiment.

A66-81487

EFFECTS OF ADDED WORK LOAD ON COMPENSATORY TRACKING FOR MAXIMUM TERRAIN FOLLOWING.

Richard A. Monty and William J. Ruby (Cornell Aeron. Lab., Inc., Human Sci. Sect., Buffalo, N. Y.)

Human Factors, vol. 7, Jun. 1965, p. 207-214. 7 refs.

Contract Bur. of Naval Weapons NOW 63-0608-C.

The relative merits of presenting each of two command signals (δ_e , the elevator deflection angle, and γ , the aircraft flight-vector angle) on a compensatory display for manual control of a simulated aircraft on a terrain-following mission were examined. It was found that imposing additional work loads on the pilot led to a greater decrement in tracking performance with the γ command than with the δ_e command. Further, the work load task itself was performed with greater proficiency while tracking with the δ_e command. The apparent merits of the δ_e command warrant further investigation.

A66-81488

A TEST OF THE EFFECTIVENESS OF SENSOR LINES SHOWING LINKAGES BETWEEN DISPLAYS AND CONTROLS

Alphonse Chapanis and Gregory R. Lockhead (Johns Hopkins U., Dept. of Psychol., Baltimore, Md.)

Human Factors, vol. 7, Jun. 1965, p. 219-229. 6 refs.

Contracts Nonr-248(55) and Nonr-4010(03).

This experiment tested the effectiveness of sensor lines (heavy lines drawn on a control panel to show the linkages between displays and controls) on simple panels made up of lights (the displays) and keys (the controls). The three independent variables were (a) size of panel (two sizes were tested), (b) compatibility of the display-control linkages (a maximally compatible and a highly incompatible arrangement were used), and (c) the presence or absence of sensor lines. Eight panels were constructed to test all possible combinations of these three independent variables. Eighty male subjects in all (ten for each panel) were used. The subject's task was to push the appropriate key as soon as a light had been turned on. Each subject was given 240 consecutive trials on the panel to which he was assigned. Dependent measures were: time to first response, time to correct response, and errors. The results show that it is more important to make the linkages between displays and controls compatible than it is to use sensor lines which show schematically the linkages between displays and controls. Sensor lines appear to have a limited kind of usefulness for panels of the type tested here: The lines improved performance only when the linkages between displays and controls were not compatible.

A66-81489

DO LARGE SHARED DISPLAYS FACILITATE GROUP EFFORT?

Sidney L. Smith (MITRE Corp., Bedford, Mass.) and Benjamin C. Duggar (Bio-Dyn., Inc., Cambridge, Mass.)

Human Factors, vol. 7, Jun. 1965, p. 237-244. 5 refs.

Contract AF 19(628)-2390.

Twelve four-man groups searched and counted visually displayed items. In one session, they used a large display shared in common by the group members; in another session, separate smaller displays were viewed individually. Information was presented under conditions of equal visual angle, so that these two display modes were logically equivalent. Performance was 15% faster with the large group display than with the small individual displays. There was no significant difference in error frequency. Some subjects preferred the large display, some the small. In a supplementary study, running individual subjects rather than groups, there were no differences in speed or accuracy between the display modes. This suggests that the difference in group performance time resulted from some facilitating effect of the shared display on the process of group interaction.

A66-81490

RECENT CZECHOSLOVAKIAN WORK ON FIGURE LEGIBILITY, COLOR STANDARDS AND ROAD SIGN STANDARDIZATION.

C. M. Bertone (Bunker-Ramo Corp., Canoga Park, Calif.)
Human Factors, vol. 7, Jun. 1965, p. 267-271. 8 refs.
 NASA Contract NASw 869.

A review is presented of the experiments conducted by the Czechoslovakian Scientific Research Institute of Work Safety in establishing accepted standard colors, figures, and road signs. Topics discussed are: (1) problem of legibility of figures, (2) effect of surrounding space, (3) centralization of controlling productive processes, (4) color coding of warning signs, and (5) legibility of road signs.

A66-81491

STUDIES OF HELICOPTER PILOT PERFORMANCE: I THE ANALYSIS OF MANEUVER DIMENSIONS.

Albert Zavala, Edwin A. Locke, Harold P. Van Cott, and Edwin A. Fleishman (Am. Inst. for Res., Washington, D. C.)
Human Factors, vol. 7, Jun. 1965, p. 273-283. 19 refs.
 Contract DA-49-193-MD-2632.

Measures of helicopter pilot proficiency were obtained on samples of student pilots in two training phases. Measures were based on students' performance on 16 and 12 separate maneuvers in the Primary and Basic training phases, respectively. Intercorrelations of maneuvers in each phase were subjected to factor analysis. In both phases maneuver performance could be described in terms of six or seven clearly interpretable common factors. The results were discussed in terms of the implications for understanding the structure and measurement of skilled psychomotor performance.

A66-81492

INFLUENCE OF HYPOTHERMIA AND OF THE FREQUENCY OF STIMULATION ON VAGAL ESCAPE.

Mira Pasić and R. K. Andjus (Beograd U., School of Math. and Nat. Sci., Inst. of Physiol. and Inst. of Biol., Dept. of Physiol., Yugoslavia).

(*Yugoslav Biol.*, 2nd Congr., Feb. 9, 1962).

(*Arhiv Bioloških Nauka*, vol. 16, no. 3-4, 1964, p. 109-129. In Serbo-Croatian).

Archives of Biological Sciences, vol. 16, no. 3-4, 1964, p. 23-40. 22 refs. Translation.

The effects of vagal stimulation during hypothermia (body temperatures of 35, 30, 25, 20, and 15°C.) were studied in adult rats by electrocardiogram recording. Irrespective of frequency of stimulation, asystolic periods were infrequent at normal body temperature. Maximum asystole frequency was found from 20-30°C. Duration of asystole ranged from 10 sec. up to over 40 sec. Considerable individual variation was observed.

A66-81493

COMPARATIVE STUDY OF THE EFFECT OF COLD ON THE PLASMA CONCENTRATION OF 17,21-HYDROXY-20-KETOSTEROIDS AND ADRENAL ASCORBIC ACID OF RAT AND SUSLIK.

V. Petrović and V. Janić (Beograd U., School of Math. and Nat. Sci., Inst. of Physiol. and Inst. of Biol., Yugoslavia).

(*Arhiv Bioloških Nauka*, vol. 16, no. 3-4, 1964, p. 145-153. In Serbo-Croatian).

Archives of Biological Sciences, vol. 16, no. 3-4, 1964, p. 53-60. 12 refs. Translation.

Weights of adrenal glands in rats and susliks after a six-hour cold stress (5-8°C.) were not greater than those in animals adapted to thermal neutrality (28-30°C.). Weights of adrenal glands of susliks sacrificed in May and June were significantly greater than those recorded in animals sacrificed in November. The amount of ascorbic acid in the adrenal glands of rats after a six-hour exposure to cold (5-8°C.) was significantly lower than in the control group ($p < 0.01$). Under the same experimental conditions no change in the amount of adrenal ascorbic acid was found in susliks, whether examined in May and June or in November. Under the influence of external cold there was a significant increase in the 17,21-hydroxy-20-ketosteroid concentration in rat plasma, and in susliks examined in May and June, with respect to controls ($p < 0.01$). There was no such increase in susliks in November. It seems that the pituitary-adrenal system of susliks cannot be stimulated in the fall by a brief exposure to cold. It is concluded that an increased weight of the adrenal glands is not always an indicator of increased concentration of cortical hormones in the blood circulation.

A66-81494

TRANSFER OF TEAM SKILLS AS FUNCTION OF TYPE OF TRAINING.

William A. Johnston (Ohio State U., Columbus).

Journal of Applied Psychology, vol. 50, Apr. 1966, p. 102-108. 9 refs.

Contract U. S. Navy N61339-1327.

Five groups varying in training context (team versus individual) and skill acquisition (individual, coordination, and communication skills) were compared at transfer on team (coordination of interceptions) and individual (number of interceptions) performance of a simulated radar-controlled aerial intercept task. Individual performance was unaffected by the training variables, but team performance was a positive function of the emphasis on coordination skills during training. When acquisition of coordination skills was held constant, context had no effect on transfer performance. Intrateam communications retarded performance but prohibiting these communications during training did not lessen their disruptive effect at transfer. This inhibitory influence of team communications reflected the verbal transmittal of information irrelevant to the task or more readily obtainable from the radar scopes.

A66-81495

DECISION QUALITY AS A MEASURE OF VISUAL DISPLAY EFFECTIVENESS.

Carl A. Silver, James M. Jones, and Daniel Landis (Franklin Inst. Res. Labs., Philadelphia, Pa.)

Journal of Applied Psychology, vol. 50, Apr. 1966, p. 109-113. 8 refs.

Contract AF 30(602)-3302.

A new gaming technique was employed in an attempt to evaluate more accurately the effectiveness of visual displays. Eighteen male university students acted as traffic managers for a hypothetical trucking concern. Trucking information was

presented in map-plus-overlay displays and the subjects manipulated trucks, drivers, and loads within the framework of the economic rules governing the trucking operation. A computer program was written which determined the profit in dollars of each subject's performance. Three independent variables (a) use of color, (b) fact density, and (c) compression (ratio of symbols to facts) were used in this repeated measures design. The analysis of variance indicated that profit was a positive function of increasing fact density ($p < .001$), and that there was a significant interaction between fact density and color ($p < .001$), and fact density and compression ($p < .05$). The usefulness of this technique in differentiating among structurally different visual displays is discussed.

A66-81496**STIMULUS AND RESPONSE FIDELITY IN TEAM TRAINING.**

George E. Briggs and William A. Johnston (Ohio State U., Columbus).

Journal of Applied Psychology, vol. 50, Apr. 1966, p. 114-117.

Contract U.S. Navy N61339-1327.

Transfer performance of 2-man teams was observed in a simulated radar-controlled aerial intercept task following either high or low stimulus (S-) fidelity and either high or low response (R-) fidelity training treatments. Both high S- and high R-fidelity training treatments resulted in superior transfer task performance; however, the effects of high R-fidelity training were relatively brief. It is concluded that whereas both are desirable, it is less important to provide high R-fidelity training at least for tasks where the major output requires verbal communication skills.

A66-81497**AN ASYMMETRICAL TRANSFER EFFECT IN RESEARCH ON KNOWLEDGE OF PERFORMANCE.**

I. D. Brown (Med. Res. Unit, Appl. Psychol. Res. Unit, Cambridge, Great Britain).

Journal of Applied Psychology, vol. 50, Apr. 1966, p. 118-120.

Gibbs and Brown (1955) reported that the motivational aspect of knowledge of results had a significant effect upon performance of a repetitive monotonous task, aside from its informative and rewarding aspects. In an experiment with 12 subjects, output on document copying was 25% higher when it was displayed on a digital counter than when the counter was covered. Chapanis (1964) duplicated the main features of the experiment by testing 16 subjects on the task of punching teletype tape and found there was no significant advantage in displaying output. The present note demonstrates that the discrepancy between these findings results from a difference between the experimental designs used. The 2-way asymmetrical transfer effects produced by Gibbs and Brown's design, in which Group I had condition K (knowledge of results) the N NK (no knowledge of results), Group II had NK then K, show that knowledge of results may have a significant effect only when the task has previously been performed without it. The importance of other variables for future investigations of this topic are also briefly discussed.

A66-81498**USE AND EVALUATION OF DISCRETE TEST INFORMATION IN DECISION MAKING.**

Richard B. Darlington and Glenn F. Stauffer (Cornell U., Ithaca, N. Y.)

Journal of Applied Psychology, vol. 50, Apr. 1966, p. 125-129, 5 refs.

Elementary decision theory is applied to the problems of evaluating discrete tests or test items used to classify people into several categories, and choosing which of several treatments is best for persons falling within each response category. The technique explicitly considers the base rates of the various criterion groups and the relative seriousness of different types of errors of classification, as well as the proportion of each criterion group falling in each response category.

A66-81499**CHANGES IN ATTITUDES OF LEARNERS WHEN PROGRAMMED INSTRUCTION IS INTERPOLATED BETWEEN TWO CONVENTIONAL INSTRUCTION EXPERIENCES.**

Charles O. Neidt and Terry F. Meredith (Colo. State U., Fort Collins).

Journal of Applied Psychology, vol. 50, Apr. 1966, p. 130-137, 15 refs. Dept. of HEW supported research.

The purpose of this study was to determine the nature of changes in student attitudes when programmed instruction is interpolated between conventional instruction experiences. Five parallel forms of a 26-item Likert type attitude scale were administered in counterbalanced order to 70 airmen studying radiation detection and 53 airmen studying camera repair at Lowry Air Force Base. Both courses included several weeks of lecture, a programmed unit, and several more weeks of conventional instruction. Students' attitudes were significantly more favorable during the programmed unit in both courses. Changes were considerably more pronounced for the 17 highest ability students.

A66-81500**A PRELIMINARY STUDY OF A TEST FOR AIR TRAFFIC CONTROLLERS.**

Louis D. Hartson (Oberlin Coll., Ohio).

Journal of Applied Psychology, vol. 50, Apr. 1966, p. 138-142.

A test, employing the analogies format, was constructed from diagrams representing jet aircraft on a radar scope. From the verbalized reactions to the problems presented by the test, of the air flight controllers who acted as subjects, sketches were prepared describing each subject's attitudes and methods of handling the potential confrontations indicated. When these sketches were read to three members of the training staff of the Oberlin FAA Center each judge made a perfect score in identifying the subjects.

A66-81501**THE EFFECT OF EXERCISE ON MUSCLE GLYCOGEN AND ELECTROLYTES IN NORMALS.**

J. Bergström and E. Hultman (St. Erik's Sjukhus, Clin. Lab., Stockholm, Sweden).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 18, no. 1, 1966, p. 16-20, 16 refs. City of Stockholm supported research.

Muscle glycogen, muscle electrolytes, plasma electrolytes, and blood glucose were studied in four healthy human subjects before and after moderate muscular exercise on a bicycle ergometer in recumbent position. Needle biopsies were taken from a quadriceps femoris muscle before and after 30 minutes' exercise, then again after a subsequent rest period of one hour. Blood samples were taken from a brachial artery, a femoral vein, and an antecubital vein. In all subjects a significant decrease of the muscle glycogen was found immediately after exercise (mean decrease 29%). In two subjects resynthesis of the glycogen towards basal values was noted one hour after exercise. The arteriovenous glucose difference in the working

leg decreased to zero or became negative during exercise, indicating that the glucose uptake from the blood was negligible. A minor loss of potassium from the working muscle invariably occurred, with an attendant increase in the arterial potassium concentration. No other changes in muscle electrolyte content were recorded. The results indicate that muscle glycogen is the main carbohydrate source for muscle activity, and that this may be a limiting factor in work capacity.

A66-81502

A SENSITIVE ERYTHROPOIETIN ASSAY ON MICE EXPOSED TO CO-HYPOXIA.

Jan Fogh (Rigshosp., Dept. of Nucl. Med. and Fibiger Lab., Biol. Dept., Copenhagen, Denmark).

Scandinavian Journal of Clinical and Laboratory Investigation, vol. 18, no. 1, 1966, p. 33-44. 34 refs.

A bioassay for the determination of erythropoietin is described. Mice are made erythremic by means of carbon monoxide hypoxia, and the incorporation of ^{59}Fe into the red cells is used as a parameter of the erythropoiesis. During the period of hypoxia the hematocrit of the animals rises to 75-80%. The spontaneous incorporation of ^{59}Fe falls during the days after cessation of the hypoxia and reaches a minimum on the seventh day. At that time the erythroid tissue is depleted of precursors of erythrocytes and the erythropoiesis has practically stopped. By inducing hemolysis in the erythremic mice, it has been shown that no endogenous erythropoietic stimulation is present as long as the hematocrit level of the animals is higher than 55%, and that the erythropoiesis can be re-activated only by exogenous erythropoietin stimulation factor (ESF) under these conditions. The optimum time for administration of the test material to the animals has been studied and it has been shown that the effect of a given quantity of ESF on the incorporation of ^{59}Fe is increased if the dose is fractionated. The hypothesis is advanced that, apart from stimulating the production of erythrocytes, ESF directly or indirectly increases the number of ESF-sensitive cells. The sensitivity of the method is about 0.03 unit. The dose-response curve for erythropoietin standard B has been determined. The method described is reliable and sensitive and can be carried out with few and simple tools.

A66-81503

EFFECTS OF OXYGEN AND BELLADONNA DRUGS ON HEART RATE AND FINGER VOLUME PULSATIONS IN MAN.

Carl Redderson and J. S. Gravenstein (Fla. U., Coll. of Med., Dept. of Anesthesiol., Gainesville).

(Intern. Anesthesia Res. Soc., 40th Congr., Bal Harbour, Fla., Feb. 27-Mar. 3, 1966).

Anesthesia and Analgesia, vol. 45, Mar.-Apr. 1966, p. 239-243. 7 refs.

Grant NIH GM-427.

In six healthy volunteers the effects of the inhalation of oxygen on heart rate and the amplitude of finger volume pulsations were studied before and after belladonna alkaloids were given in dosages designed to produce either a bradycardia or a tachycardia. Despite strong belladonna effects, oxygen caused measurable changes in heart rate and the amplitude of finger volume pulsations. It is possible that not all of the element's effects on the cardiovascular system are mediated through the vagus nerve.

A66-81504

THE EFFECTS OF THIAZIDES IN IDIOPATHIC HYPERCALCIURIA.

Edmund R. Yendt, Raymond J. A. Gagné, and Moussa Cohanin (Toronto U., Dept. of Med. and Toronto Gen. Hosp., Farquharson Invest. Unit., Canada).

(Am. Clin. and Climatol. Assn., 78th Meeting, Williamsburg, Va., Oct. 26, 1965).

American Journal of Medical Sciences, vol. 251, Apr. 1966, p. 449-460. 15 refs.

Grant Med. Res. Council, Canada M.T. 681.

The administration of hydrochlorothiazide to 29 patients with idiopathic hypercalciuria was followed in most instances by a marked reduction in the urinary excretion of calcium. The maximum effect was not achieved until the second or third day of thiazide administration but was then sustained. Metabolic studies done in seven patients showed that there was usually a fall in fecal calcium as well but this effect appeared to be only temporary. Thiazides also produced a sustained rise in the urinary excretion of magnesium. The manner in which these effects are produced is not clear but the changes in calcium metabolism can be partially reversed by the administration of ammonium chloride by mouth or by the infusion of potassium chloride. The preliminary results of thiazide administration to prevent further stone formation in patients with idiopathic hypercalciuria are sufficiently encouraging to warrant further therapeutic trials.

A66-81505

POISONING BY VOLATILE COMPOUNDS. I. AROMATIC HYDROCARBONS.

R. Bonnichsen, A. C. Maehly, and M. Moeller (Govt. Lab. for Forensic Chem., Stockholm, Sweden).

Journal of Forensic Sciences, vol. 11, Apr. 1966, p. 186-204. 20 refs.

The application of chemical procedures and gas chromatography to analyses of biological materials for benzene and aromatic hydrocarbons with aliphatic side chains is discussed. A sensitive chemical procedure for determination of benzene, toluene, and xylenes, based on the Janovsky reaction between nitrated hydrocarbons, alkali, and ketone is described. Thirty-four case reports involving poisoning by aromatic hydrocarbons and the subsequent toxicologic findings are presented.

A66-81506

INTRA-ARTERIAL BLOOD PRESSURE RECORDING IN THE UNRESTRAINED CHICK DURING WAKEFULNESS AND SLEEP.

C. E. Spooner and W. D. Winters (Calif. U., Center for the Health Sci., Brain Res. Inst. and Dept. of Pharmacol., Los Angeles).

Archives internationales de Pharmacodynamie et de Thérapie, vol. 161, May 1966, p. 1-6. 10 refs.

Grants PHS 5TI-MH-6415, MH-10836 and AFOSR 246-63.

A method of recording mean arterial blood pressure from the ischiatic artery of the unrestrained young chick is described. The mean arterial blood pressure of awake but quiet 6-14 day old chicks averaged 112 mm. Hg, but fluctuations were observed during extremes of chick behavior. The fluctuations bore the same behavioral relationships as are well known for mammalian species, i.e., the mean arterial pressure was elevated 5-10 mm. Hg when the chicks were asleep. During the rhombencephalic phase of sleep, no apparent change in blood pressure level was observed. Biphasic blood pressure fluctuations induced by the injection of eserine sulfate (0.5 mg./kg.) were not related to the drug-induced electroencephalographic and behavioral sleeplike states.

A66-81507

INCREASED TOLERANCE TO CEREBRAL ANOXIA BY PENTOBARBITAL.

A. Goldstein, Jr., B. A. Wells, and A. S. Keats (Baylor U., Coll. of Med., Div. of Anesthesiol., Houston, Tex.)
Archives internationales de Pharmacodynamie et de Thérapie, vol. 161, May 1966, p. 138-143. 14 refs.
 Grants Houston Heart Assn. 47R/4/63/64 and Cardiovascular and Lipid Clin. Res. Center HE-5435-04.

By simultaneous occlusion of both cavae and the ascending aorta, cerebral anoxia of 8-15 min. was produced in 132 dogs. The tolerance of the dog brain to cerebral anoxia was increased by intravenous pentobarbital sodium (30 mg./kg.) but not by morphine sulfate (15 mg./kg.) nor by 100% oxygen with or without added carbon dioxide.

A66-81508

INFORMATION CAPACITY OF DISCRETE MOTOR RESPONSES UNDER DIFFERENT COGNITIVE SETS.

Paul M. Fitts and Barbara K. Radford (Mich. U., Ann Arbor).
Journal of Experimental Psychology, vol. 71, Apr. 1966, p. 475-482. 22 refs.
 Contract AF 49(638)-1235.

Previous findings on the interrelations of speed, amplitude, and accuracy of movements support the conclusion that the human motor system has a relatively constant information capacity over rather wide limits. The two experiments here reported examine extensions of this conclusion by comparing (a) movements that are initiated at subject's convenience vs. movements following a 2-choice reaction time, and (b) the effects of variations in instructions and payoffs emphasizing speed vs. accuracy. It is concluded that (a) there is little or no benefit in spending additional time in preparation for the initiation of a skilled movement; only an increase in the time actually spent in executing a movement is of value in increasing accuracy, and (b) within limits, the information capacity of the human motor system is relatively invariant under changing cognitive sets for speed vs. accuracy.

A66-81509

VISUAL SEARCH AND IMMEDIATE MEMORY.

Ira T. Kaplan, Thomas Carvellas, and William Metlay (N. Y. U. Med. Center, Ophthalmol. Dept., New York City).
Journal of Experimental Psychology, vol. 71, Apr. 1966, p. 488-493. 5 refs.
 Grant Natl. Inst. of Mental Health MH 08164.

Two experiments examined the relationship between search time and number of targets searched for. The first experiment photographed the subject's eye movements as he compared two groups of letters to determine whether one was a subset of the other. The time spent searching the containing set increased in proportion to the number of target letters it contained. In this case, search time included the time spent recognizing all the targets. The second experiment photographed the subject's hand movements as he canceled just-learned target letters in English text. Here search was measured so that it excluded the accumulation of recognition times. Search time still increased with the number of targets being sought.

A66-81510

TRANSFER OF PREDIFFERENTIATION TRAINING TO GRADIENTS OF GENERALIZATION IN SHAPE RECOGNITION.

Henry C. Ellis and Robert L. Feuge (N. Mex. U., Albuquerque).
Journal of Experimental Psychology, vol. 71, Apr. 1966, p. 539-542. 6 refs.
 Grant NSF GB-924.

This experiment was designed to test the assumption that gradients of generalization in shape recognition, following paired-associates (PA) labeling practice, differed as a function of the meaningfulness of the response labels employed during PA practice. Following various conditions of PA practice, subjects were given a 30-item recognition test which consisted of both the shapes in the PA list and systematic distortions of these shapes along a dimension of similarity. No differences in gradients of false recognitions (selection of the distorted shapes) as a function of the meaningfulness of the PA label were obtained except for conditions of two PA trials. In contrast, observation pretraining alone yielded a significantly flatter gradient of false recognitions. In addition, the gradients became progressively steeper with increased amounts of PA practice.

A66-81511

TIME-INTENSITY RECIPROCITY UNDER VARIOUS CONDITIONS OF ADAPTATION AND BACKWARD MASKING.

Daniel Kahneman (Hebrew U., Jerusalem, Israel).
Journal of Experimental Psychology, vol. 71, Apr. 1966, p. 543-549. 28 refs.

Conditions under which duration-intensity reciprocity holds for acuity performance were investigated. Reciprocity fails to hold for the resolution of a Landolt C at 40 m.L. x msec. when it is immediately followed or preceded by a 2-sec. flash of 1 m.L.; performance then increases with exposure duration. Reciprocity holds when the interval between target and flash is increased to 1.5 sec. When the target is superimposed on the adapting field, reciprocity is found, but the critical duration is considerably shorter. The results are discussed in terms of recent theorizing which attributes masking by light to effects of brightness summation. The existence of an additional interference effect is indicated. The nature of this interference is discussed, with emphasis on the close similarity found between results for forward and backward masking by light.

A66-81512

EFFECTS OF DELAY OF KNOWLEDGE OF RESULTS AND SUBJECT RESPONSE BIAS ON EXTINCTION OF A SIMPLE MOTOR SKILL.

James A. Dyal (Tex. Christian U., Fort Worth).
Journal of Experimental Psychology, vol. 71, Apr. 1966, p. 559-563. 12 refs.

Following 10 no-knowledge-of-results (KR) trials subjects were trained for 40 trials in a line-drawing task under conditions of immediate, delayed, or no KR. These training trials were followed by 40 trials with no KR (extinction). Analysis of the type of error made during extinction (overshooting or undershooting the correct 3-in. line) revealed that the type of response depended on the training conditions (immediate vs. delayed) and original response bias of subject. Delayed KR resulted in an increased frequency of errors of the same type as the original response bias. Immediate KR resulted in a tendency to make errors in the direction opposite the original response bias. The interaction between delay of KR and subject's response bias argues for the analysis of subject's response bias in future experiments.

A66-81513

OPTIMALITY OF PERCEPTUAL DECISION CRITERIA.

Z. Joseph Uehla (Colo. U., Boulder and Denver).
Journal of Experimental Psychology, vol. 71, Apr. 1966,
 p. 564-569. 7 refs. Natl. Inst. of Mental Health supported
 research.

Statements of signal detectability theory have implied that subjects place their decision cutoffs in such a fashion as to maximize the expected value (EV) of their decisions. Using a 2-choice discrimination task involving judgment of the tilt of lines, the decision cutoffs of naive subjects were evaluated in different situations requiring different cutoffs for the maximization of EV. Although subjects' cutoff placement was influenced by the relevant factors, i.e., by the relative payoff yielded by the alternative decisions and by the relative probability of the stimulus alternatives, the influence was not sufficiently strong to maximize EV.

A66-81514

EFFECT OF SPATIAL PARAMETERS ON THE VIBRO-TACTILE THRESHOLD.

Ronald T. Verrillo (Syracuse U., Lab. of Sensory Commun., N. Y.)

Journal of Experimental Psychology, vol. 71, Apr. 1966,
 p. 570-575. 18 refs.

Contracts ONR NOnr 66(13) and NIH 140-145.

Some spatial parameters involved in the excitation of mechanoreceptors in glabrous skin were investigated. The extent of protrusion by the contactor into the skin, the gradient and curvature of displacement produced by the contactor and contactor configuration, and the threshold for vibration as a function of frequency and contactor area were studied. Thresholds for vibration decrease in direct proportion to the extent of protrusion by the contactor. An inverse relation exists between the vibrotactile threshold and the contactor area, having a slope of three dB. per doubling of area. Thresholds are relatively unaffected by the changes in the gradient and curvature of the displacement. Differences in slope between small and large contactors are interpreted as evidence that there may be more than one receptor system in glabrous skin responsive to mechanical deformation.

A66-81515

NEGATIVE IONIZATION: AN INVESTIGATION OF BEHAVIORAL EFFECTS.

J. C. Wofford.

Journal of Experimental Psychology, vol. 71, Apr. 1966,
 p. 608-611. 15 refs.

One hundred experimental subjects from undergraduate psychology classes performed research tasks under an increased density of negative ions, while 100 control subjects performed under normal room conditions. The problem was to determine the effects of increased negative ionization upon discrimination reaction time and manipulative dexterity tasks. Increased negative ionization had a significant effect upon latency of reaction time ($p < .01$) but not upon measures of manipulative dexterity. Simple forms of behavior seem to be influenced more by negative ionization than more complex behaviors.

A66-81516

NITROGEN- AND HELIUM-INDUCED ANOXIA: DIFFERENT LETHAL EFFECTS ON RYE SEEDS.

R. L. Latterell (Union Carbide Res. Inst., Tarrytown, N. Y.)

Science, vol. 153, Jul. 1, 1966, p. 69-70. 6 refs.

NASA Contract NASw-767.

Prolonged exposures to acute anoxia caused progressive reductions in the viability of hydrated seeds of Prolific rye. For

equal exposures of nine days or longer, mortality was significantly higher in helium than in nitrogen. The findings suggest that prolonged use of helium as a component of atmospheres in manned space capsules may be harmful.

A66-81517

LATER COURSE OF DEAFNESS DUE TO NOISE (EXAMINATIONS OF 500 WORKERS EXPOSED TO NOISE—PART II) [SPATVERLAUF DER LARMSCHWERHORIGKEIT (UNTERSUCHUNGEN VON 500 LARMARBEITERN—II. TEIL)].

W. Wagemann (Münster U., Klin. Essen, Hals- Nasen- Ohren- Klin., West Germany).

Monatsschrift für Unfallheilkunde, Versicherungs-, Versorgungs- und Verkehrsmedizin, vol. 69, Jan. 1966, p. 23-37. 47 refs. In German.

On the basis of audiograms recorded from 500 workers exposed to high noise in a ship building plant, the following observations were made: (1) Below 1,000 c.p.s. no hearing damage could be established. (2) Above 2,000 c.p.s., progressively increasing deafness was observed after the third year of exposure. (3) Hearing loss is more pronounced in the 3,000 c.p.s. than in the 4,000 c.p.s. band, decreasing in both cases after the fourth work year (maximal hearing loss, 40-50 dB.). (4) Noise induced hearing loss in the 2,000 and 6,000 c.p.s. bands (40 dB. maximal) is more gradual and occurs during the first and second work decade. (5) After having suffered maximal hearing damage, the workers are relatively safe from noise hazards. (6) Workers being first exposed to noise after their 35th year of life, demonstrate considerably greater hearing damage after the first year of exposure than the younger workers. This is not due to added presbycusis but to direct noise effect.

A66-81518

INVESTIGATION ON THE INCIDENCE OF CEREBRAL FAT EMBOLISM AFTER TRAUMA WITH VARYING SURVIVAL TIME [UNTERSUCHUNGEN ÜBER DIE HÄUFIGKEIT DER CEREBRALEN FETTEMBOLIE NACH TRAUMA MIT VERSCHIEDEN LANGER ÜBERLEBENSZEIT].

R. H. E. Henn and W. Spann (Max-Planck-Inst., Deut. Forschungsanstalt für Psychiatrie, München und München U., Inst. für Gerichtl. Med. und Versicherungsmed., West Germany).

Monatsschrift für Unfallheilkunde, Versicherungs-, Versorgungs- und Verkehrsmedizin, vol. 68, Dec. 1965, p. 513-522. 13 refs. In German.

The incidence of cerebral fat embolism in death due to trauma was studied in 140 accident cases. With one exception severe degrees of fat embolism were found only with post-accident survival measured in days. In some cases, where it was possible to study the lungs, pulmonary fat emboli were found in greater amounts at an earlier stage. In eleven cases brain purpura was found. Certain criteria are proposed for fat embolism as the cause of death.

A66-81519

THE SUBJECTIVE COMPLAINTS OF NOISE DEAFNESS. I. INVESTIGATION OF 500 WORKERS IN NOISY OCCUPATIONS [DIE SUBJEKTIVEN BESCHWERDEN DER LARMSCHWERHORIGKEIT].

W. Wagemann (U. Münster, Klin. Essen, Hals-Nasen-Ohrenklin., West Germany).

Monatsschrift für Unfallheilkunde, Versicherungs-, Versorgungs- und Verkehrsmedizin, vol. 68, Dec. 1965, p. 546-553. In German.

Observations on 500 workers exposed to continuous high-noise conditions in a ship building plant revealed the following symptoms: (1) Initial partial deafness, tinnitus, headaches, a feeling of pressure in the head, and drowsiness. (2) These symptoms, which occur either singly or in combinations, recede after a few weeks; however, 25% of the workers complained about continued tinnitus as late as a year after the initiation of symptoms, i.e., within the first 10 years of exposure. (3) Deafness was observed after about one year in 33% of the workers. It was described as subjectively increasing by 25% and as unchanged by 22%. (4) The majority reported no change in tinnitus.

A66-81520

ENVIRONMENTAL COMPLEXITY, CEREBRAL CHANGE, AND BEHAVIOR.

Mark R. Rosenzweig (Calif. U., Berkeley).

(*Am. Psychol. Assn., Chicago, Sep. 1965*).

American Psychologist, vol. 21, Apr. 1966, p. 321-332. 23 refs. NASA, PHS, Surg. Gen. Office, and AEC supported research.

The results of research in the effect of differential experience on the anatomical structure and biochemical state of the brain in experimental animals are discussed. Rats were assigned at weaning and kept for 80 days in either an enriched environment (environmental complexity and training) or in an impoverished condition. There was an increase in brain weight as a result of learning; the cortical/subcortical weight ratio was consistently greater for the enriched animals. The total activity of acetylcholinesterase was slightly but consistently elevated. Total protein, hexokinase, and ribonucleic acid (RNA) values did not show any change. The number of neurons within region measured showed a slight decrease, but the glial element was slightly increased. The significance of these findings and the implications of animal research for human subjects is outlined.

A66-81521

THE EFFECTS OF FOOD DEPRIVATION OF RATS ON SWIMMING TO EXHAUSTION.

Edward T. Uyeno and R. Alan Graham (Stanford Res. Inst., Menlo Park, Calif.)

Behaviour, vol. 26, part 3-4, 1965, p. 351-356. 13 refs.

Male Wistar rats were deprived of food for three days and then forced to swim continuously to a criterion of exhaustion. Controls swam after ad libitum feeding. In the first experiment a load equal to 11% of the rat's body weight was attached to the dorsal skin near the tail during the swim. In a second study, two matched groups, treated identically as those in the first study swam without a load in water treated with a wetting agent, "Aerosol O.T.". In a third experiment, controls as well as experimentals were deprived of food for three days. The control group, however, was fed for 30 minutes, immediately before the swim. A fourth experiment was conducted in a similar manner as the third, except both groups were deprived six hours. In each of the experiments the deprived groups swam significantly longer than the fed groups.

A66-81522

BRIGHTNESS DISCRIMINATION OF THE VISUAL ANALYZER AND IRREGULARITY OF BRIGHTNESS IN THE VISUAL FIELD. 2: INFLUENCE OF ONE OR MORE LATERAL LIGHT SOURCES IN A LIGHT BACKGROUND ON VISION [UNTERSCHIEDSEMPFINDLICHKEIT DER LEUCHTDICHTE IM SEHFELD. 2: EINFLUSS EINER UND MEHRERER SEITLICHER LICHTQUELLEN AUF HELLEM HINTERGRUNDE AUF DIE SICHT]

V. Maňák (Slovakische Akad. der Wiss., Inst. für exptl. Hyg., Bratislava, Czechoslovakia).

Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 12, Mar. 1966, p. 161-174. 49 refs. In German.

The results of experimental investigations concerning the effects of lateral brightness (10° from center of sight, 1.8 candles/sq.cm., 20° and 40° from the visual axis) on brightness discrimination are summarized. At a brightness of the inner area of 0.12 candle/sq.cm. and a brightness of the surrounding area of 0.013 candle/sq.cm., a simultaneous positive induction effect of the added brightness on foveal brightness discrimination was observed. When the light source was positioned 40° from the visual axis, individual differences in the effects on brightness discrimination were observed. The results of another series of experiments are reported in which several lateral light sources act on the brightness discrimination of the visual analyzer at a circumferential brightness of 0.007 and 0.013 candle/sq.cm. and an internal area brightness of 0.13 candle/sq.cm. An increasing enhancing effect of added light source (8-10 candles/sq.cm.) proportional to their increase in number up to 24 was observed. The increase of brightness discrimination is attributed primarily to stimulation of the peripheral sections of the retina.

A66-81523

INVESTIGATIONS REGARDING STRESS ON FLYING PERSONNEL IN LONG-DISTANCE JET FLIGHTS [UNTERSUCHUNGEN ZUR BELASTUNG DES BORDPERSONALS AUF FERNFLUGEN MIT DUSENMASCHINEN].

K. E. Klein, H. Brüner, and S. Ruff (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Inst. für Flugmed., Bad Godesberg, West Germany).

Zeitschrift für Flugwissenschaften, vol. 14, Feb. 1966, p. 109-121. 41 refs. In German.

The following data were determined on crew members of German transatlantic airliners, over a period of twenty-five scheduled flights: pulse and blood pressure, electrocardiogram, oral temperature, eosinophil count, hematocrit, hand coordination ("Klopfest"), psychomotor performance ("Eutaxia Test"), and optical reaction time. In addition, each test subject answered a questionnaire regarding personal discomfort (headaches, etc.), thirstiness, fatigue, etc. Results were tabulated and are graphically represented. It is shown that the diurnal performance rhythm can be modified by motivational factors. E.g., landing and take-off have reactivating effects even on fatigued crews. Such effects are the more pronounced the closer they are to the peak values on the diurnal activity curve. This should have some bearing on the scheduling of long-distance flights.

A66-81524

PNEUMOMETRIC INVESTIGATIONS CONCERNING BRONCHOMOTOR REACTION DURING WORK [PNEUMOMETRISCHE UNTERSUCHUNGEN ÜBER DIE BRONCHOMOTORISCHE REAKTION BEI ARBEIT].

Gunther Hildebrandt and Helmut Cuntze (Marburg a.d. Lahn U., Physiol. Inst., Abt. für Arbeitsphysiol. und Rehabilitationsforsch., West Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 21, no. 4, 1965, p. 247-268. 52 refs. In German.

In 11 healthy students the expiratory peak flow was measured in short intervals in a lying and sitting position as well as during 30 min. work on a bicycle-ergometer (30-120 watts). Pulse and respiratory rate were recorded continuously. An additional eleven subjects worked up to 150 watts until exhaustion. The average of peak flow values was found to be about 7.1% higher in a sitting than in a lying position. With

increasing work load the peak flow increased about 0.8% per 10 watts. In certain individuals the total increase amounted to as much as 25%. The changes in peak flow were correlated with the changes in pulse and respiratory rate. During constant work load, the peak flow remained at a constant level (steady state), even up to exhaustion. During recovery the peak flow returned to the initial values within a few minutes, paralleling the respiratory rate. Sitting up was mainly correlated with the initial value of the peak flow in recumbency, but the reactions to work load were predominantly related to the resting condition of the autonomic system as indicated by the resting values of the pulse rate. Bradycardiac subjects tended to have smaller reactions. Since the peak flow during work and recovery does not correspond to the changes of the catecholamine blood level as reported in the literature, it is concluded that bronchodilation during work is not controlled by epinephrine secretion, in contrast to the bronchomotor reaction after sitting up. Close connection between peak flow and respiratory rate, as well as the small bronchodilatory effect of CO₂ found in rebreathing experiments, suggest that the bronchomotor reaction to work is controlled predominantly by nervous mechanisms.

A66-81525

THE EFFECT OF SYSTEMATIC PHYSICAL ACTIVITY ON MAXIMAL PERFORMANCE AND FUNCTIONAL CAPACITY IN SENESCENT MAN.

Andrej Fischer (Res. Inst. for Exptl. Therapy, Prague, Czechoslovakia), Jana Pařízková (Phys. Culture Res. Inst., Prague, Czechoslovakia), and Zdeněk Roth (Inst. for Ind. Hygiene and Occupational Diseases, Prague, Czechoslovakia).

Internationale Zeitschrift für angewandte Physiologie, vol. 21, no. 4, 1965, p. 269-304. 71 refs.

An investigation was made of the physiological factors conditioning the decline in physical performance and the functional capacity of the organism with age in man, and the influence of systematic physical activity on physical performance and on the functional condition of circulation and respiration. Maximal performance was determined on a bicycle ergometer with progressively increasing load on 171 men with sedentary occupations, aged 53 to 90 years, of whom 69 had carried out physical activity all their lives. The following conclusions were reached: (1) Maximal oxygen consumption per kg. lean body mass declines with age. (2) Systematic physical activity maintains physical performance at the level of younger age categories by preventing the decline in the maximal metabolic rate of the lean body mass with age and thereby maintains the higher functional capacity of the organism. (3) Ventilation function tests show higher values of vital capacity and maximal breathing capacity in trained subjects at the same values of timed respiratory capacity as a percent of vital capacity. (4) Indices of the elasticity of the brachial artery are at a level of younger age groups in trained subjects as compared with non-trained subjects.

A66-81526

STRESS DIFFERENCES IN FEMALE WORKERS DURING EARLY AND LATE SHIFTS [BELASTUNGSUNTERSCHIEDE BEI ARBEITERINNEN IN FRUH- UND SPATSCHICHT].

E. Groll and H. Haider (Vienna U., Hyg.-Inst., Austria).

Internationale Zeitschrift für angewandte Physiologie, vol. 21, no. 4, 1965, p. 305-312. 32 refs. In German.

Grant PHS 1 R05 TW 00 156-01 and Arbeitsgemeinschaft zum Studium der Arbeitsbelastung supported research.

The effects of physiological and psychological stress in female workers were determined as related to times of shifts

(early or late shifts). On the basis of questionnaires filled out by the subjects, as well as measurements of pulse rate and vigilance tests, it was found that the late shifts revealed significantly increased circulatory stress, while vigilance was improved. Self-observations expressed in the questionnaires showed considerable decrease in subjective assessment of well-being at the outset of the shift but better values at the end. The results are interpreted in light of diurnal rhythms and the "activation theory", which states that a certain degree of activation of the organism is a prerequisite for optimal fitness for work.

A66-81527

LUNG ATELECTASES AS A DECOMPRESSION SYMPTOM [LUNGENATELEKTASEN ALS DEKOMPRESSIONSSYMPTOM].

G. Schubert and H. Kolder (Vienna U., Physiol. Inst., Austria). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 4, 1965, p. 313-317. 8 refs. In German.

Decompressed rats showed close correlation between survival time and frequency of atelectases. Both depend on the pressure and duration of exposure. Lung atelectases were observed at the onset of recompression. Survival time was prolonged by anesthesia, and formation of atelectases was reduced. Artificial respiration after recompression prolonged survival time about five times.

A66-81528

THORACIC CAGE FUNCTION DURING BRIEF AND REPEATED INTERRUPTIONS OF THE AIR CURRENT [COM- PORTEMENT DE LA CAGE THORACIQUE PENDANT L'INTERRUPTION BREVE ET ITERATIVE DU COURANT AERIEN].

R. Marcelle, J. M. Petit, J. Damoiseau, F. Pirnay, and R. Bottin (Liège U., Inst. Léon Fredericq, Physiologie; and Inst. Ernest Malvoz, Prov. de Liège, Belgium).

Internationale Zeitschrift für angewandte Physiologie, vol. 21, no. 4, 1965, p. 318-325. 5 refs. In French.

Repeated airway interruption to the lungs was practiced on five healthy males to study thoracic cage movement. During airway interruption, after abolishing the dynamic pressure gradient, buccal pressure and alveolar pressure subsequently underwent slow variation. The simultaneous measurement of the extrathoracic spiogram and the buccal barogram permitted the association of the variation with thoracic movement.

A66-81529

RELATIVE MOVEMENT OF ADJACENT VERTEBRAE DURING OSCILLATORY STRESS [RELATIVBEWEGUNG BENACHBARER WIRBEL UNTER SCHWINGUNGSBELASTUNG].

W. Lange and R. Coermann (Max Planck-Inst. für Arbeitsbelastung, Dortmund, West Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 21, no. 4, 1965, p. 326-334. 6 refs. In German.

Relative vertical displacements of adjacent spinous processes (4th and 5th and the 3rd and 4th lumbar vertebrae) were measured in a subject sitting erectly on a board, which vibrated at frequencies from 2 to 12 c.p.s. Maximal displacements at the order of 0.5 mm. (at 0.5 g) were observed between 4 and 5 c.p.s. Time of exposure was between 30 and 45 minutes. Calculations led to the conclusion that there is a direct relationship between spinous process displacement and degree of compression of the intervertebral disk.

A66-81530
DEFORMATION AND SWELLING OF ERYTHROCYTES DUE TO PLASMA FACTORS AFTER SEVERE BURNS [ERYTHROCYTENEFORMIERUNG UND QUELLUNG DURCH PLASMAFAKTOREN NACH SCHWEREN VERBRENNUNGEN].

D. Braasch and G. Gössling (Marburg/Lahn U., Physiol. Inst., West Germany).

Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 1, 1966, p. 1-11. 18 refs. In German.

Anesthetized dogs and rabbits were scalded or burned by infrared radiation. Blood samples taken before and at different times after the burning were incubated for several hours at 37°C. The shape of the red blood corpuscles was recorded every ten minutes. After one hour of incubation only a small part of the erythrocytes of the control animals had changed their shape into budded and crenated ones. In contrast to the controls, up to 70% of the erythrocytes were crenated or even transformed into spheres when blood samples were taken 20 hours after the burning. It is believed that the factors altering the shape during incubation might also be responsible for the changes seen after burning. Because swollen red blood corpuscles have lost their flexibility and are presumably unable to pass through the terminal capillaries, it is suggested that the disturbances in microcirculation in shock may be due—in part—to non-flexible, rigid erythrocytes.

A66-81531
BRIGHTNESS DISCRIMINATION OF THE VISUAL ANALYZER AND IRREGULARITY OF BRIGHTNESS IN THE VISUAL FIELD: I. GLARE EFFECT OF A LATERAL PIN-POINT LIGHT SOURCE ON DARK BACKGROUND ON FOVEAL BRIGHTNESS DISCRIMINATION [UNTERSCHIEDSEMPFINDLICHKEIT DES SICHTANALYSATORS UND UNREGELMÄSSIGKEIT DER LEUCHTDICHTE IM SEHFELD: I. BLENDWIRKUNG EINER SEITLICHEN PUNKTFÖRMIGEN LICHTQUELLE AUF DUNKLEM HINTERGRUNDE AUF DIE FOVEALE UNTERSCHIEDSEMPFINDLICHKEIT].

V. Maňák (Slovakische Akad. der Wiss., Inst. für exptl. Hyg., Bratislava, Czechoslovakia).

Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 12, Feb. 1966, p. 92-98. In German.

The effects of position and projection area of added brightness (2.5 candles/sq.cm.) on foveal brightness discrimination were evaluated experimentally under laboratory conditions on school children, whose visual functions were normal. The added brightness acted on a practically dark background, while the inner area in the visual field was illuminated (6.0025 candle/sq.cm. at center). It was found that an added pinpointed brightness had a negative effect on brightness discrimination, and that the latter deteriorated further when the area of added brightness was enlarged. This corresponds with results described in the literature. However, contrary to previous reports, the glare effect of the lateral brightness did not decrease when its distance from the line of sight increased.

A66-81532
ELECTRORETINOGRAM AND RETINAL IMPULSE ACTIVITY DURING HYPOTHERMIA [ELEKTRORETINOGRAMM UND RETINALE IMPULSAKTIVITÄT IN HYPOTHERMIE].

Ch. Baumann (Max-Planck Ges., W. G. Kerckhoff-Inst., Bad Nauheim (West Germany) and W. D. Heiss (Vienna U., Physiol. Inst., Austria).

Experientia, vol. 22, Mar. 15, 1966, p. 184-185. 5 refs. In German.

Intern. Brain Res. Organ. supported research.

The effect of deep hypothermia on the single fibre activity of the optic nerve and on the electroretinogram (ERG) was studied in the cat. The ganglion cell activity of the retina was more resistant than the ERG against the effect of cooling. There was a marked delay in the restitution of the b-wave during rewarming.

A66-81533
CLINICO-BIOCHEMICAL DATA ON THE INFLUENCE EXERTED BY TOTAL AND LOCAL HIGH-FREQUENCY VIBRATION ON THE METABOLISM OF CERTAIN VITAMINS [KLINIKO-BIOKHEMICHESKIE DANNYE O VLIYANII OBSHCHEI I LOKAL'NOI VYSOKOCHASTOTNOI VIBRATSII NA OBMEN NEKOTORYKH VITAMINOV].

A. S. Mel'kumova and N. N. Pushkina (F. F. Erisman Inst. of Hyg., Moscow, USSR).

Gigiena Truda i Professional'nye Zabollevaniia, vol. 10, Jan. 1966, p. 21-25. 21 refs. In Russian.

The authors inquire into the effects produced by vibration on the metabolism of vitamins C, B₁, B₂, PP (niacin) and carotin (provitamin A) in workers of moulding departments in prefabricated armored concrete structure plants and in patients suffering from the vibration disease at its different stages. The supply of vitamins in the organism of workers exposed to the effects of vibration was found to be much below normal. The intensity and duration of changes discovered in the vitamin metabolism depended upon the parameters of the vibration. The elevated need for vitamins observed among respective categories of workers necessitates institution of massive vitamin treatment.

A66-81534
BIOLOGICAL EFFECT OF STABLE NOISE AT DIFFERENT LEVELS [K VOPROSU O BIOLOGICHESKOM DEISTVII STABIL'NOGO SHUMA RAZNYKH UROVNEI].

A. A. Arkad'evskii (F. F. Erisman Inst. of Hyg., Moscow, USSR).

Gigiena Truda i Professional'nye Zabollevaniia, vol. 10, Jan. 1966, p. 47-49. 8 refs. In Russian.

Several groups of young healthy males were subjected to continuous noise of various intensities in a sound-proof room. Audiometric, chronoreflexometric, and vascular tonometric readings were taken, with additional electrocardiographic data. No specific conclusions could be reached from the data obtained on the functional state of an organism. The audiometric data, however, showed that continuous noise of 75 dB. with maximal sound pressure of 4,000 c.p.s., for a period of one hour led to the development of deafness. Exposure to sound level of 65 dB. was not found to be harmful to the subject's hearing, even for a long period of exposure.

A66-81535
ACTION OF PROTECTIVE CHEMICAL COMBINATIONS AGAINST IONIZING RADIATION [DZIALANIE CHEMICZNYCH ZWIAZKOW OCHRONNYCH W PROMIENIOWANIU JONIZUJACYM].

Jerzy Semkowicz.

Lekarz Wojskowy, vol. 41, no. 3, 1965, p. 159-164. 17 refs. In Polish.

This is a brief review of the recent literature on chemical radioprotective agents. While the physiological mechanism of chemical radioprotection is not quite fully understood, it must be assumed that we are dealing primarily with enhancement of biological protective functions. Thus, a number of agents act indirectly by diminishing the oxygen content and thereby inducing a protective effect normally associated with

anoxia. In studying the effectiveness of a given protective agent a longer period of time is required, not less than 30 days.

A66-81536

THE PROBLEM OF TEMPORAL ORDER IN STIMULATION AND PERCEPTION.

James J. Gibson (Cornell U., Graduate Psychol., Labs., Ithaca, N. Y.)

Journal of Psychology, vol. 62, Mar. 1966, p. 141-149. 8 refs. Contract ONR 401(14).

The concept of memory in its relation to perception is a muddle. If we accept the fact of sequential perception, rejecting the fiction of momentary pattern-perception, matters become more intelligible. If perception involves the apprehension of a changing world, not a frozen one, the problem is that of detecting invariants under transformation. The permanence can be isolated just because the perspectives change. The latter do not have to be stored up and put together in a composite. The mechanism of perceptual learning is one in which the nervous system resonates to the invariants of the stimulus flow, not one of storage and retrieval of engrams. The recalling of the past, the capacity (in some persons) to summon memory images into consciousness, may well be a quite incidental accompaniment of learning, not its basis.

A66-81537

ELECTROCUTANEOUS PAIN THRESHOLDS IN HUMANS TO LOW FREQUENCY SQUARE-WAVE PULSES.

Robert Plutchik and Henry Bender (Hofstra U., Dept. of Psychol., Hempstead, Long Island, N. Y. and Matrix Corp., Nashua, N. H.)

Journal of Psychology, vol. 62, Mar. 1966, p. 151-154. 11 refs. Contract Nonr-2252(01).

Young human subjects of both sexes were subjected to low frequency square-wave pulses. Each pulse had a uniform pulse width of 50 msec. Pulse trains were five seconds long with rest intervals of 30 sec. The subjects were presented with rates of 1, 3, 6, 10, and 15 pulses per second (p.p.s.) in counter-balanced order, three times each, using a five-second period of stimulation and a 30-second interstimulus period. The intensity of current was increased by 0.1 ma. The subject's report was taken at the end of each five-second stimulus period. The relationship between threshold and pulse rate indicated that males had a higher pain threshold than females, and the thresholds were highest at 1 p.p.s. with a gradual decrease, which would probably continue to decline at pulse rates greater than 15 p.p.s. The pain threshold was not determined by the energy in a single pulse, but by some function of pulse height, duration, and repetition rate. The difference of pain threshold in sexes may indicate a physiologic-anatomic sex difference in skin characteristics.

A66-81538

POTENTIAL VALUE OF EDUCATIONAL BACKGROUND DATA IN THE SELECTION AND CLASSIFICATION OF MILITARY PERSONNEL.

Chester J. Judy (Personnel Res. Lab., Lackland AFB, Tex.)

Journal of Psychology, vol. 62, Mar. 1966, p. 195-200.

Correlational techniques were used to examine the relationships between selected educational background variables and final school grade in five technical courses conducted for Air Force student officers. The conclusion is reached that the relationships are high enough to demonstrate the general usefulness of background information on college education for predicting technical school performance, and that the validity

of educational information may be expected to approach or surpass that which can be demonstrated for a current selection and classification test.

A66-81539

A STUDY OF CERTAIN VISUAL EFFECTS OCCASIONED BY FACTORS OF SO-CALLED GLARE.

Richard F. Haines and S. Howard Bartley (Mich. State U., Dept. of Psychol., East Lansing).

Journal of Psychology, vol. 62, Mar. 1966, p. 255-266. 17 refs. Grant NIH 1F1 MH-16,907-01A1.

A small target moving in the frontal plane was made to disappear and reappear by passing it behind a larger fixed target of much greater luminance. The angular positions at which this disappearance and reappearance occurred were measured. These positions indicated that the fixed target was, in effect, larger than physical measurements of it would signify. Since a luminous target casts not only its expected image upon the retina but also a tapering amount of stray illumination, this stray illumination makes the target image a tapered rather than an abrupt affair and covers a greater retinal area than expected. The moving images of other less intense targets, as they approach the peripheral region of the taper of the fixed target, may be obscured just as when they fall nearly at its center. Hence, objects producing these images may be made to disappear and reappear at positions over a greater angular extent in the frontal plane than otherwise expected. This was found to be the case in the present investigation. Three levels of intensity for the fixed retinal image were used and the positions of disappearance and reappearance were different for each, in the way expected.

A66-81540

LOUDNESS ADAPTATION AS A FUNCTION OF FREQUENCY, INTENSITY, AND TIME.

Warren H. Teichner and Ernest Sadler (Tufts U., Dept. of Psychol., Medford, Mass.)

Journal of Psychology, vol. 62, Mar. 1966, p. 267-278. 17 refs. Grant AFOSR 60-2 and Contract AF-AFOSR-958-65.

Subjects were exposed to sound of 3,500 c.p.s. and 5,000 c.p.s. frequencies, each at two intensities, 85 and 95 dB., re 0.0002 dyne per square centimeter. Each combination was presented to the standard ear for 0.25, 0.50, 1.0, 2.0, and 5.0 minutes. Test ears were then stimulated by these combinations, both ears simultaneously. The results obtained by this method were not in agreement with previous studies. (1) Intensity did not affect the amount of adaptation; (2) frequencies above 1,000 c.p.s. did not affect adaptation; (3) adaptation was complete within 0.25 minute; and (4) the amount of adaptation was relatively small. However, loudness was the basis of the judgments made, and the amount of adaptation was independent of the subject's equal-loudness or double-loudness setting.

A66-81541

BIOCHEMICAL STUDIES OF THE INNER EAR FLUIDS IN THE CAT. PRELIMINARY REPORT.

Herbert Silverstein.

Annals of Otology Rhinology and Laryngology, vol. 75, Mar. 1966, p. 48-63. 22 refs.

The concentrations of total protein, glucose, and malic and lactic dehydrogenase were determined in the inner ear fluids of the cat and compared to cerebrospinal fluid and serum. The values of malic and lactic dehydrogenase in perilymph were three to six times higher while the total protein concentration was 10 times the value found in cerebrospinal fluid.

Perilymph analyzed from the scala tympani and scala vestibuli showed similar values for total protein, glucose, and lactic and malic dehydrogenase. The biochemical data, to date, suggest that perilymph may be a blood filtrate derived from the capillaries of the perilymphatic space. As compared to perilymph, endolymph obtained from both the vestibular and cochlear portions of the labyrinth showed elevated values of lactic dehydrogenase (295 Int. m.u./ml.), malic dehydrogenase (655 Int. m.u./ml.) and low values for glucose (15 mg.%). The low concentration of glucose in endolymph is interpreted as being a reflection of the high metabolic activities of the stria vascularis and the organ of Corti. Endolymphatic sac fluid contained very high values for both lactic and malic dehydrogenase. Endolymph probably functions as a vehicle to transport nutrients (i.e., glucose) from the stria vascularis to the organ of Corti and also to carry away metabolic waste products from the organ of Corti to be absorbed possibly in the endolymphatic sac.

A66-81542

SUBTRACTION HEARING LOSS, LOUDNESS RECRUITMENT AND DECRUITMENT.

Hallowell Davis and Allan C. Goodman (Central Inst. for the Deaf, St. Louis, Mo. and Harvard Med. School, Children's Hosp. Med. Center and Dept. of Otolaryngol., Boston, Mass.).

Annals of Otolaryngology and Laryngology, vol. 75, Mar. 1966, p. 87-94.

Grant Natl. Inst. of Neurol. Diseases and Blindness B-3856.

The normal relation of subject loudness to intensity is regular, smooth, and lawful. The most frequently recognized abnormality of the loudness function is a more-rapid-than-normal growth of loudness with increase of intensity, namely, loudness recruitment. An hypothesis is presented to the effect that a random loss of sensory units ("sensory unit" is defined as a nerve fiber of the auditory nerve and the sensory cells of the organ of Corti which excite it) may result in a reduction of the maximum subjective loudness. Several cases of neural and central lesions are presented, some with normal thresholds. These illustrate a less-rapid-than-normal growth of loudness with intensity which may be attributed to such a loss or block of sensory units. The condition is referred to as "decrement." Several cases are illustrative. More observations are necessary to establish the incidence and possible localizing value of the symptom.

A66-81543

EFFECT OF MEDIASTINUM WEIGHT ON ESOPHAGUS ELASTICITY [INFLUENCE DE LA PESANTEUR DU MEDIASTIN SUR L'ELASTANCE OESOPHAGIENNE].

J. M. Petit, Ch. Jacquemin, J. Damoiseau, P. Varenne and J. Troquet (Centre d'Essais en Vol, Bretigny-sur-Orge, France).

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 4-6, 11 refs. In French.

Resistance to endo-esophageal pressure was measured in five adult human males during +7 g acceleration. Elasticity increased in a linear fashion, dependent on g: approximate pressure-volume coefficient increase of one cm. water per ml. per g increase of one. The significance of the results is discussed in terms of the role of the mediastinal weight in the determination of esophageal elasticity and in the measurement of pulmonary mechanics.

A66-81544

MEASUREMENT OF ACCELERATIONS IN LOW ALTITUDE FLIGHT OF HIGH-SPEED AIRCRAFT AND THEIR EFFECT ON THE PILOT [MESURE DES ACCELERATIONS EN VOL A BASSE ALTITUDE SUR AVIONS RAPIDES ET LEUR INCIDENCE SUR LE PILOTE].

J. Perrochon, H. Seris, and R. Auffret.

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 7-9. In French.

Physical stress to the aircraft and physiological stress to pilots were measured during 227 low altitude, high speed flights of Mystère 4 A and Mirage III B aircraft. Acceleration due to air turbulence and squalls was tolerable for 15-30 min. The response of the aircraft depended on its external form. Due to the tiring nature of such flights, it is suggested that reliable, automatic instruments for guidance and control of the aircraft be installed to help the pilots.

A66-81545

REPORT ON SERIOUS DISTURBANCES OBSERVED IN PASSENGERS AT THEIR ARRIVAL AT ORLY AIRPORT OVER A PERIOD OF 31 MONTHS [RELEVÉ DES TROUBLES SÉRIEUX CONSTATÉS CHEZ DES PASSAGERS À LEUR ARRIVÉE À L'AÉROGARE D'ORLY SUR UNE PÉRIODE DE 31 MOIS].

Bergot (Aéroport de Paris, Service Méd., France).

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 10-11. In French.

During the 31 months and the six million commercial aircraft passengers under consideration, four deaths were reported, possibly due to cardiac failure. Also, 14 serious cardiac illnesses and seven serious cases of respiratory difficulty were recorded.

A66-81546

STUDY CONCERNING THE PROGRESS OF GLYCEMIA IN PILOTS AS A FUNCTION OF THE GLUCIDE RATION [ÉTUDE DE L'ÉVOLUTION DE LA GLYCÉMIE CHEZ DES PILOTES EN FONCTION DE LA RATION GLUCIDIQUE].

Jacques Fabre, Michel Pingannaud, and Philippe Lasseur.

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 12-15, 10 refs. In French.

One-hundred-twenty-one pilot candidates were questioned concerning their glucose consumption at breakfast. Of this group, glycemia was measured in 7 fasting subjects, in 10 subjects who had eaten 80-100 g. glucose, and in 35 subjects who had consumed over 100 g. sugar. It was determined that the ingestion of food rich in carbohydrates does not preclude the occurrence of hypoglycemia later in the morning, and that this factor should be investigated in accidents.

A66-81547

PHYSIOLOGICAL EFFECTS OF THERMIC SHOCK. I. METHODS AND MEANS OF STUDY [LES EFFETS PHYSIOLOGIQUES D'UN CHOC THERMIQUE. I. MÉTHODES ET MOYENS D'ÉTUDE].

Jean Colin and Y. Houdas (Centre d'Essais en Vol, Lab. de Méd. Aéronautique, Bretigny-sur-Orge, France).

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 16-19. In French.

Diagrams and a description of a high temperature chamber are stated. Methods of continuous monitoring of body weight and body temperature (cutaneous, rectal, buccal, and tympanic) by thermocouples are described.

A66-81548

NOTE ON A SIMULATED ANOXIA TEST ON 83 ATHLETES IN THE DECOMPRESSION CHAMBER [NOTE SUR L'ÉPREUVE D'ANOXIE FICTIVE EN CAISSON CHEZ 83 ATHLÈTES].

F. Plas.

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 20. In French.

Variations in cardiac rhythm and electrocardiogram (ECG) recordings were studied in 83 athletes at rest and after 30 min. of exercise at ground level and at 3000 and 4000 m. simulated altitude. Fifteen showed decreased cardiac rhythm between 3000 and 4000 m., but 67 exhibited altitude adaptation. The ECGs of 47 subjects were unchanged, but 35 showed changes in ST and T segments. Response to exercise showed great individual variation.

A66-81549

NOTE ON RADIATION PROTECTION PROVIDED BY ULTRA-SHORT WAVES IN BACTERIA [NOTE SUR LA RADIO-PROTECTION EXERCÉE PAR DES ONDES ULTRA COURTES VIS-A-VIS DE BACTERIES].

L. Miro, H. Atlan, Y. Arnaud, G. Deltour, and R. Loubiere.

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 21. In French.

Cultures of *Escherichia coli* were exposed to high frequency electromagnetic waves in an attempt to assess their radioprotective properties against cobalt-60 gamma rays. Survival curves were identical after 6000 r, but after 24,000 and 48,000 r survival was greater for bacteria previously exposed to electromagnetic waves. After 72,000 r, mortality curves were identical.

A66-81550

SPELEOLOGIC EXPEDITION IN THE VITARELLES CAVERNS IN AUGUST 1964: BIOLOGICAL AND PSYCHOPHYSIOLOGICAL RESULTS [EXPEDITION SPELEOLOGIQUE A LA CAVITE DES VITARELLES EN AOUT 1964: RESULTATS BIOLOGIQUES ET PSYCHO-PHYSIOLOGIQUES].

P. Saumande and R. Angiboust.

Revue de Médecine Aéronautique, vol. 4, no. 16, 1965, p. 22-24. In French.

Fifteen subjects between the ages of 17 and 27 remained in the Vitarelles Caverns at 15-16°C. without time cues, August 18-26, 1964. After the first day, urinary volume decreased significantly while density increased. Excretion of urinary sodium, potassium, and urea decreased slowly but steadily during the sojourn, but mucoprotein excretion decreased exponentially with time. Rectal temperature showed inversion of nycthemeral rhythm and results of time estimation tests paralleled those of rectal temperatures.

A66-81551

O-BENZYLTHIAMINE DISULFIDE: STUDIES ON ANTI-FATIGUE EFFECTS OF THE CONCOMITANT USE OF O-BENZYLTHIAMINE DISULFIDE WITH L-K, MG-ASPARTATE.

Hiroshi Fujioka, Osamu Noguchi, Mikio Nagamori, and Takeshi Asai.

Journal of Science of Labour (Rōdō Kagaku), vol. 42, Feb. 1966, p. 103-107. In Japanese.

Ground Self Defense Force personnel in training for marathon racing were given L-K,Mg-aspartate either alone or concomitantly with O-benzylthiamine disulfide (BTDS). The anti-fatigue effects of administration were evaluated by means of several easily-measurable fatigue indices, such as muscular strength. The results obtained are summarized as follows: (1) The concomitant use of BTDS with L-K,Mg-aspartate showed the most remarkable effect at an early stage. (2) Next to the combined use, the simple administration of the salts exerted a moderate anti-fatigue effect, but the effect of the administration of BTDS alone was somewhat inferior.

A66-81552

RESPIRATORY DEAD SPACE DURING TRANSVERSE ACCELERATION [L'ESPACE MORT RESPIRATOIRE AU COURS DES ACCELERATIONS TRANVERSES].

J. Demange, Ch. Jacquemin, J. Timbal, and P. Varène (Centre d'Essais en Vol, Lab. de Méd. Aéronautique, Bretigny-sur-Orge, France).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 4-7, 6 refs. In French.

Respiratory dead space was measured in four subjects during transverse acceleration by means of pneumotachometric registration of respiratory flow and spectrometric determination of carbon dioxide concentration in the expired gas. The increase in respiratory dead space is attributed to bronchodilatation of congested dorsal pulmonary areas due to the transverse acceleration.

A66-81553

RECENT DATA OF EXPERIMENTAL HYPEROXIC LESIONS [DONNEES RECENTES SUR LES LESIONS EXPERIMENTALES DE L'HYPEROXIE].

R. Loubière, A. Pfister, J. Fabre, and C. Violette (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 8-11, 8 refs. In French.

The morphologic and microscopic effects of hyperoxia (722, 684, and 608 mm. Hg partial pressure of oxygen) on rats are reported. After 722 mm. Hg for 2-5 days, pulmonary edema and cardiac insufficiency were observed, accompanied by signs of venous stasis within the liver, spleen, and pancreas. Adaptation of the animals to 684 mm. Hg was observed; after 20 days, pulmonary lesions included inflammation of parenchyma and pleura, and lesions of the liver, pancreas, and adrenal glands. Anatomic-pathologic changes were minimal after 608 mm. Hg for 20 days.

A66-81554

STATISTICAL CONSIDERATIONS REGARDING OCCURRENCES OF HYPACOUSIA AND DEAFNESS IN CIVIL AVIATION FLIGHT TECHNICIANS OBSERVED DURING MEDICAL CHECK-UP VISITS [CONSIDERATIONS STATISTIQUES SUR LES HYPOACOUSIES ET SURDITES DU PERSONNEL NAVIGANT TECHNIQUE DE L'AVIATION CIVILE AU COURS DES VISITES MEDICALES DE CONTROLE].

J. Bastien, P. Galban, P. Blanc, G. Sourdois, and J. Robion.

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 12-16. In French.

A statistical survey is made of hearing tests from 3,448 flight personnel members taken from 1961 through 1964. Of 217 incidents of hypoacusia, 207 were ruled compatible with flight duty after tests of audiometry for tone and language intelligibility, and tests to determine the exact level of deafness. The following conclusions emerge: (1) Hypoacusia is most frequently encountered in navigators and in pilots. (2) The most common type of hypoacusia is that of perception. (3) Hypoacusia is more frequently found in aging, experienced subjects, but an exact correlation between decreased hearing and age, flight duty, and number of flight hours is difficult to establish.

A66-81555

LET US BE CAREFUL IN THE INTERPRETATION OF ISOLATED VENTRICULAR REPOLARIZATION DISTURBANCES [SOYONS PRUDENTS DANS L'INTERPRETATION DES TROUBLES ISOLÉS DE LA REPOLARISATION VENTRICULAIRE].

L. Tabusse and R. Pannier.

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 16-19. In French.

Two case histories of atypical cardiac repolarization in flight personnel are discussed. The clinical evolution of the benign cardiac anomaly, through arterial hypertension, to angina pectoris in one and hemiplegia in the second should lead to a stricter evaluation of personnel members who present such anomalies.

A66-81556

STATISTICAL DATA ON THE CAUSES OF DISABILITY AT THE TIME OF MEDICAL CHECK-UPS IN CIVIL AVIATION FLIGHT TECHNICIANS [DONNEES STATISTIQUES SUR LES CAUSES D'INAPTITUDES LORS DES VISITES MEDICALES DE CONTROLE DU PERSONNEL NAVIGANT TECHNIQUE DE L'AVIATION CIVILE].

P. Galban, E. Cranotier, R. Carre, and J. Robion (Centre Principal d'Expertise Méd. du Personnel Navigant de l'Aéron., Paris, France).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 20-23. In French.

A statistical survey of 3,113 professional flight personnel (airplane and helicopter pilots, and navigators) revealed 97 cases of disability, of which the most prevalent were from trauma (25 cases), cardiovascular sicknesses (19 cases), neuro-psychiatric sicknesses (12 cases), ophthalmological problems (11 cases), and otorhinolaryngological sicknesses (11 cases). Most of the cases of general sickness (excluding accidents) were observed in subjects above 40 years of age.

A66-81557

CARDIAC FREQUENCY AND VISUAL OBSERVATION [FREQUENCE CARDIAQUE ET SURVEILLANCE VISUELLE].
R. Angiboust, M. Gerardin, M. Gouars, and R. Vedel (Centre d'Expériences Aériennes Mil., Lab. d'Etudes Medico-physiol., Mont de Marsan, France).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 24-26. In French.

Polygraphic registration was made of signals propagated and perceived, electroencephalogram, cardiac frequency, and respiratory frequency during a two-hour vigilance task. The data were statistically computed. Individual variation was found, but in all subjects cardiac frequency was higher during the vigilance task than with eyes closed. Correlations were observed between cardiac frequency and psychological state of the subject, amount of sleep deprivation the previous night, and motivation. It is postulated that increased cardiac activity during vigilance is due to two mechanisms: (1) a non-specific neural activation linked to increased attention, and (2) a more specific mechanism linked to the sensory modality involved, which brings about increased postural tonus in the neck and lumbar muscles.

A66-81558

WORKING CONDITIONS OF SUPERSONIC TRANSPORT CREWS: DATA ON MEDICAL FITNESS STANDARDS [CONDITIONS DE TRAVAIL DES EQUIPAGES D'AVIONS DE TRANSPORT SUPERSONIQUES: INCIDENCES SUR LES STANDARDS MEDICAUX D'APTITUDES].

Auffret, Franchi, and Seris.

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 27-30. In French.

Working conditions are discussed for crew members on supersonic jet aircraft such as the new delta-wing "Concorde"

in terms of high altitude problems: hypoxia, clothing, radiation, and visibility. Automatic controls will be relied on heavily to supplement the human crew. Crew members selected for the jets must be psychologically and mechanically adaptable to a new working environment. Suggestions are made to clarify the medical requirements with respect to cardiac frequency, ophthalmology, otorhinolaryngology, and electroencephalographic psychology.

A66-81559

SUBJECTIVE EFFECTS OF TIME SHIFTS (AN INQUIRY AMONG THE FLIGHT PERSONNEL OF AIR FRANCE) [LES EFFETS SUBJECTIFS DES DECALAGES HORAIRE (UNE ENQUETE AUPRES DU PERSONNEL NAVIGANT D'AIR-FRANCE)].

J. Lavernhe, E. Lafontaine, and R. Laplane (Air France, Serv. Méd., Paris, France).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 30-36. In French.

A survey was conducted among Air-France personnel to determine the principal physiological effects of time shifts in long-distance flights to and from North America. Time shifts were blamed for disturbances in sleep and/or digestive patterns as reported in 78%; but climatic variation, change in nocturnal environment, time spent at destination, different foods, nervous tension, and night flying were also implicated. Most subjects adapted to a new time schedule in 48 hours. The youngest subjects were the least affected by time changes.

A66-81560

METHOD OF STUDYING BACTERIAL MUTATIONS INDUCED BY COSMIC RAYS [METHODE DE RECHERCHE DE MUTATIONS BACTERIENNES INDUITES PAR LES RAYONS COSMIQUES].

H. Atlan, G. Deltour, and R. Loubière (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 37-39. 11 refs. In French.

Three balloons containing auxotrophic cultures of *Escherichia coli* were flown to altitudes of 27,000, 31,000, and 33,000 m. A low level of reverse mutations from auxotrophic to prototrophic growth was found. One mutation in the first ascent was presumably due to a heavy ion particle, and a group of mutations observed in the third ascent could have been caused by disintegration of a heavy ion.

A66-81561

EVACUATION OF THE SEVERELY INJURED FROM THE CONGO TO BELGIUM BY A CIVIL AIR LINER TRANSFORMED INTO AN AMBULANCE PLANE [EVACUATION DES BLESSES GRAVES DU CONGO VERS LA BELGIQUE PAR UN AVION CIVIL TRANSFORME EN AVIONE SANITAIRE].

Henri Brouns and André Allard (Sabena, Brussels, Belgium).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 40-43. In French.

A description is presented of evacuation of about 30 injured men and women from the Congo to Belgium. Regular seats in the Sabena plane were converted to beds and equipped with oxygen. Medical personnel included a doctor, an anesthesiologist, and four nurses. Pressurization of the cabin was maintained at 4,000 feet during the flight. It is concluded that: (1) Airlines should be ready to convert one of their regular airplanes into an ambulance airplane quickly. (2) Even the most seriously injured can be transported without danger

if certain precautions are followed. (3) Special facilities of an ambulance airplane easily may be incorporated into regular passenger airplanes. (4) Airlines should have available medical personnel capable of rendering help to the injured. (5) The medical services of the airlines must be equipped, materially and administratively, to handle transportation of the injured.

A66-81562

SURVEILLANCE OF FLIGHT TECHNICIANS OVER A PERIOD OF 15 YEARS: BIOLOGICAL CONSTANTS [SURVEILLANCE DU PERSONNEL NAVIGANT TECHNIQUE PENDANT UNE PERIODE DE 15 ANS—LES CONSTANTES BIOLOGIQUES].

André Allard and André Delascluse (Sabena, Brussels, Belgium). *Revue de Médecine Aéronautique*, vol. 4, no. 15, 1965, p. 44-49. In French.

The following biological constants were determined every six months from 1948 to 1963 in 515 Sabena airlines pilots, navigators, radio operators, and mechanics: number and sedimentation rate of white and red blood cells; blood sugar, urea, and cholesterol; syphilis test; and qualitative test of urine. No significant change was found in any biological constants during the time studied.

A66-81563

AUDITORY DISTURBANCES IN CIVILIAN FLIGHT PERSONNEL [TROUBLES DE L'AUDITION CHEZ LE PERSONNEL NAVIGANT CIVIL].

A. Hustin.

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 50-51. In French.

Noise and vibration produce acoustic fatigue in pilots and other flight personnel which may lead to deafness. Barotrauma, induced by differences in middle ear pressure, aggravates the situation. The evolution of increased auditory threshold due to noise exposure is described. The necessity is stressed for regular audiometric testing and indoctrination of navigation personnel for the avoidance of ear and hearing problems and for the consultation with otorhinolaryngological specialists.

A66-81564

ARRANGEMENT OF EQUIPMENT ON BOARD CONVENTIONAL PLANES FOR THE DETECTION OF ATMOSPHERIC GERMS AT HIGH ALTITUDE [ORGANISATION DE L'APPAREILLAGE A BORD D'AVIONS CONVENTIONNELS EN VUE DE LA DETECTION DES GERMES DE L'AIR EN ALTITUDE].

M. Maissonnet, H. Seris, and R. Auffret.

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 52-53. In French.

The use of the hydroaeroscope to detect air-borne bacteria by direct growth on medium in Petri plates is described. After introduction of air samples, the plates were wrapped in a triple thickness of filter paper to prevent contamination. Preliminary results showed the presence of a number of bacteria at 6,700 m. The bacteria differ somewhat from terrestrial organisms of the same name. The differences may be due to environmental oxygen pressure, temperature, humidity, and meteoritic factors.

A66-81565

PROBLEMS OF HYGIENE ON BOARD SPACE SHIPS [PROBLEMES D'HYGIENE A BORD DES VAISSEAUX COSMIQUES].

M. P. Nicolas.

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 54-60. In French.

The problems of hygiene on any spacecraft are examined in terms of environmental, individual, and work area hygiene. Environmental hygiene comprises atmosphere, oxygen regeneration, elimination of toxic gases, regulation of temperature and humidity, solar light problems, noise, and vibration. Individual hygiene is concerned with suitable and acceptable food, potable water, and the problem of excreta. The conditions of the work environment involve the use of protective clothing, weightlessness effects on muscles and on calcium metabolism, isolation phenomena, and changes in circadian rhythm.

A66-81566

STUDY OF RECORDING METHODS OF RESPIRATORY MOVEMENTS IN A PERMANENTLY WIRED ANIMAL [ETUDE DES METHODES D'ENREGISTREMENT DES MOUVEMENTS RESPIRATOIRES CHEZ UN ANIMAL EN PREPARATION CHRONIQUE].

G. Chatelier and J. Ginet (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France).

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 61-65. In French.

Respiratory movements in animals may be studied by monitoring the electrical activity of the muscles involved in respiration, e.g., by diaphragmatic electromyography, or by recording thoracic movement electrically, i.e., by pneumography. The manner of inserting electrodes and the precautions which should be taken are examined. Several tracings from cats and rats are presented.

A66-81567

THE PROBLEM OF ATMOSPHERIC OZONE AND ITS SIGNIFICANCE IN AVIATION [LE PROBLEME DE L'OZONE ATMOSPHERIQUE ET SES INCIDENCES AERONAUTIQUES].

P. L. Biget, J. Fabre, and A. Vauzelle.

Revue de Médecine Aéronautique, vol. 4, no. 15, 1965, p. 66-76. 60 refs. In French.

A review of atmospheric ozone is presented in terms of physical properties, quantity and distribution in the atmosphere, preparation in the laboratory, detection techniques, toxicity in experimental animals (mice, guinea pigs, rats, rabbits, cats), and physiological effects on respiration, heart, and lungs of human organisms. A concentration of 0.05 p.p.m. is detectable by humans. The biological effects of ozone concentrations from 0.01 to 10 p.p.m. and the potentiating effects on drugs and chemical compounds are listed. For high altitude and space flight, toxic ozone concentrations may be found at 7,000-12,000 m. and higher. Means of eliminating toxic concentrations from space cabins are discussed.

A66-81568

NOISE PROBLEMS IN HELICOPTER TRANSPORTATION OF PATIENTS [LARMPROBLEME BEIM HUBSCHRAUBERKRANKENTRANSPORT].

W. Lorenz and H. G. Demus (Martin-Luther-U., Klin. für Hals-Nasen und Ohrenkrankheiten, Halle-Wittenberg, East Germany). *Verkehrsmedizin und ihre Grenzgebiete*, vol. 12, Oct. 1965, p. 525-532. 25 refs. In German.

The Mi-4 helicopter, which is being used for transportation of patients, was investigated with regard to interior and exterior noise levels. Noise levels were found to range between 110 and 120 dB. at frequencies between 75 and 200 c.p.s.

Helicopters are thus the noisiest means of transportation of patients. Since high noise constitutes an additional health hazard, noise reducing measures in ambulance helicopters are most urgently required.

A66-81569

CIRCADIAN RHYTHM IN PINEAL TYROSINE HYDROXYLASE.

Edith G. McGeer and Patrick L. McGeer (British Columbia U., Dept. of Psychiatry, Kinsmen Lab. of Neurol. Res., Vancouver, Canada).

Science, vol. 153, Jul. 1, 1966, p. 73-74, 11 refs.

Grants NSF GB-827, Med. Res. Council of Canada MA-1421, and Fed.-Provincial Public Health 609-7-108.

Tyrosine hydroxylase is the rate-limiting enzyme in catecholamine synthesis. The rat pineal gland is richly innervated by sympathetic nerves from the superior cervical ganglia. The activity of tyrosine hydroxylase was measured in rat pineal gland at 4-hour intervals over a daily cycle of 12 hours of light (7 a.m. to 7 p.m.) and 12 hours of darkness. The results indicate a circadian rhythm with the maximum activity, at 11 p.m. to 3 a.m., about triple the low values observed at 3 p.m. The pattern is similar in phase to that previously reported for melatonin and hydroxyindole-O-methyl transferase activity.

A66-81570

SLEEP DEPRIVATION IN THE RAT.

Robert A. Levitt (Fla. U., Dept. of Psychol., Gainesville).

Science, vol. 153, Jul. 1, 1966, p. 85-87, 8 refs.

Grant NIH-MH-03881-03 and NASA supported research.

Sleep deprivation, induced by injections of dextroamphetamine or forced treadmill activity, resulted in a temporary increase in daily sleep time. However, increasing the period of sleep deprivation above 24 hours to 72 or 120 hours did not result in increased recovery sleep above that present in the 24-hour group.

A66-81571

ON THE PROBLEM OF WATER AND ELECTROLYTE BALANCE AT HIGH TEMPERATURES [ZUR FRAGE DES WASSER- UND ELEKTROLYTHAUSHALTES BEI HOHEN TEMPERATUREN].

L. Schmidt (Schiffahrtsmedizinisches Institut der Marine, Kiel-Kronshagen, West Germany).

Arbeitsmedizin Sozialmedizin Arbeitshygiene, vol. 1, Feb. 1966, p. 44-50. In German.

The author distinguishes three major disturbances of the water balance mechanism due to high temperatures: water deficiency (hypertonic dehydration), sodium deficiency (hypotonic dehydration), and water poisoning (hypotonic hyperhydration). (1) Water deficiency occurs after reduced water intake and/or increased water loss. Sodium concentration, i.e., osmotic pressure, increases in the extracellular space affecting the osmoreceptors. Through hypothalamic pathways antidiuretic hormone (ADH) secretion is stimulated including tubular water resorption. At high water loss, the plasma volume is reduced to the point of reducing the heart minute volume. Erythrocyte concentration increases. Drinking of too much electrolyte-free water results in hypotonic dehydration and may lead to water poisoning. (2) In most cases hypotonic dehydration (sodium deficiency) is caused by renal or extrarenal sodium loss. Only the extracellular volume is affected, resulting in relatively early circulatory symptoms, such as vertigo, fainting, and muscle cramps. Hardly any NaCl can be detected in the urine. (3) Hypotonic hyperhydration is the result of too much water intake

without adequate replacement of NaCl loss due to heavy sweating. The clinical symptoms may be severe: drowsiness, nausea, vomiting, muscle cramps, increased saliva and tear flow, and diarrhea. Urine volume decreases and anuria may result. If the symptoms are accelerated, one refers to the syndrome as water poisoning. The most effective therapeutic measures are administration (orally or intravenously) of water in the case of water deficiency and of hypertonic NaCl solution in the case of sodium deficiency. Hypotonic hyperhydration is best treated by intravenous administration of hypertonic NaCl solution.

A66-81572

ON A SIMPLE ERGOMETER TEST FOR THE INVESTIGATION OF PERFORMANCE RESERVES OF THE HEART IN PHYSICAL EXAMINATIONS OF DRAFTEES [UBER EINEN EINFACHEN ERGOMETERTEST ZUR ERMITTLUNG DER LEISTUNGSRESERVEN DES HERZENS BEI MUSTERUNGS-UNTERSUCHUNGEN].

K. König, H. Reindell, and H. Roskamm (Med. U.-Klinik, Freiburg i. Br., West Germany).

Wehrmedizin, vol. 4, Apr. 1966, p. 65-73, 14 refs. In German.

The authors describe a simple performance test for the assessment of performance reserves of the heart, suitable for conditions encountered in physical examinations of draftees. The test is carried out on a bicycle ergometer in a horizontal or in a sitting position. Pulse and peripheral blood pressure are measured; in addition, a stress electrocardiogram is recorded. The selected stress intensity is a performance of 100 watts for six minutes. Starting from normal pulse rate values at 100 watts, established in healthy subjects, a classification into three groups was carried out on the basis of a statistically determined scatter diagram. The results of this test in terms of pulse values recorded in the lower or upper normal scatter area (Group I and II) or above the normal scatter limit (Group III) is discussed in detail.

A66-81573

AN ANALYSIS OF THE SPINAL INFLUENCES ACTING ON MOTONEURONS DURING SLEEP IN THE UNRESTRAINED CAT: RESPONSES OF THE ALPHA MOTONEURONS TO DIRECT ELECTRICAL STIMULATION DURING SLEEP.

A. R. Morrison and O. Pompeiano (Pisa U., Ist. di Fisiol. e Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 497-516, 40 refs.

Grant PHS NB 02990-04

In unrestrained, unanesthetized cats the response of the α motoneurons to direct electrical stimulation was recorded from muscular nerves of the hindlimb, following deafferentation of the animal and chronic implantation of a stimulating micro-electrode in the ventral horn. The amplitude of the nerve action potential was used as a test of the state of excitability of the motoneurons during physiological sleep and wakefulness. Measurements of conduction velocity indicate that only α motoneurons, phasic in type, were involved in the response. No significant change in amplitude of this response was recorded in either extensor or flexor nerves during transition from quiet wakefulness to synchronized sleep. A marked tonic depression of the direct motoneuronal response, attributed to hyperpolarization of the motoneurons, occurred throughout desynchronized sleep. These changes in motoneuronal excitability paralleled the tonic depression of the monosynaptic reflexes which appears during desynchronized sleep in the intact animal. Generally no additional change of the direct motoneuronal

response occurred during the bursts of rapid eye movement (REM). The absence of phasic changes in motoneuronal excitability to direct stimulation during the bursts of REM suggests that the phasic depression of the monosynaptic reflexes occurring during the REM periods of desynchronized sleep is the result of presynaptic inhibition.

A66-81574

CENTRAL DEPOLARIZATION OF GROUP I_a AFFERENT FIBERS DURING DESYNCHRONIZED SLEEP.

A. R. Morrison and O. Pompeiano (Pisa U., Ist. di Fisiol. and Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 517-537. 34 refs.

Grant PHS NB 02990-04

The excitability changes of the spinal endings of group I *a* muscle afferents were tested in unrestrained, unanesthetized cats during different phases of sleep and wakefulness. For this purpose the antidromic group I *a* volley elicited by single shock stimulation of the de-efferented ventral horn was recorded from either the tibial or the deep peroneal nerve, innervating extensor or flexor muscles, respectively. No modification of the antidromic group I *a* volley was seen during the transition from quiet wakefulness to synchronized sleep. There was also no significant change in the antidromic volley during the electroencephalogram (EEG) spindles as compared to the interspindle lulls. An enhancement of the antidromic group I *a* volley occurred occasionally during the orienting reaction elicited by arousing stimuli. During desynchronized sleep no tonic change in amplitude of the antidromic group I *a* volley was observed. A phasic enhancement of the antidromic group I *a* volley was found in both flexor and extensor nerves during the bursts of rapid eye movement (REM) and usually did not outlast the ocular movements. Phasic presynaptic inhibition of the primary group I *a* endings may explain the transient depression of the homonymous monosynaptic reflexes that occurs synchronously with the REM periods of desynchronized sleep.

A66-81575

PYRAMIDAL DISCHARGE FROM SOMATOSENSORY CORTEX AND CORTICAL CONTROL OF PRIMARY AFFERENTS DURING SLEEP.

A. R. Morrison and O. Pompeiano (Pisa U., Ist. di Fisiol. and Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 538-568. 52 refs.

Grant PHS NB 02990-04.

Pyramidal activity was recorded at the medullary level in unrestrained, unanesthetized cats following unilateral chronic ablation of the motor cortex, with the aim of determining whether the modulation during sleep and wakefulness of the pyramidal discharge originating from the somatosensory cortex could be referred to volleys exerting presynaptic depolarization of the flexion reflex afferents. The integrated activity of the pyramidal tract fibers coming from the somatosensory areas of the cortex reached a steady level during quiet wakefulness, and increased transiently during induced arousal. During synchronized sleep there was a gradual decrease in the pyramidal activity when peaks of discharge synchronous with the electroencephalogram (EEG) spindles occurred. During desynchronized sleep there was phasic enhancement of the pyramidal discharge, occurring at the time of the bursts of rapid eye movement (REM). The changes

in the background activity of the pyramidal tract following ablation of the motor cortex were paralleled by changes in rate and pattern of discharge recorded from single units during the different phases of sleep in the same kind of preparation. Stimulation of the pyramidal tract following chronic degeneration of the corticospinal motor fibers elicited contralateral dorsal root potentials of the same amplitude as those induced by stimulation of the intact pyramid. The ventral root discharge was greatly reduced or completely abolished on the side opposite to the cortical ablation. The modulation during sleep and wakefulness of pyramidal activity following ablation of the motor cortex is thus likely to reflect changes in the level of depolarization of the flexion reflex afferents. In particular, the increase in the pyramidal discharge originating from the somatosensory cortex during the bursts of REM may contribute, through a mechanism of presynaptic inhibition, to the phasic depression of the polysynaptic reflex that occurs at the time of the bursts of REM.

A66-81576

VESTIBULAR INFLUENCES DURING SLEEP: I. ABOLITION OF THE RAPID EYE MOVEMENTS OF DESYNCHRONIZED SLEEP FOLLOWING VESTIBULAR LESIONS.

O. Pompeiano and A. R. Morrison (Pisa U., Ist. di Fisiol. and Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 569-595. 64 refs.

Grant PHS NB 02990-04

The neural mechanisms responsible for the appearance of the rapid eye movements (REM) during desynchronized sleep were analyzed. Bilateral lesions of the vestibular nuclei did not prevent the normal rhythm of sleep and wakefulness nor did they substantially alter the phases of synchronized and desynchronized sleep in unanesthetized cats. The most remarkable change, however, was the complete abolition of the bursts of REM typical of desynchronized sleep. Only isolated rapid ocular movements were observed. The phase of deep sleep in these preparations was still characterized by desynchronized electrocortical activity and by complete relaxation of the posterior cervical muscles. These changes are due to destruction of second-order vestibular neurons since the REM were still present following complete cerebellectomy and/or bilateral section of the VIIIth nerve. The abolition of the REM was seen when the lesion affected completely the vestibular nuclei of both sides. Bilateral lesions limited to the medial and descending vestibular nuclei were equally effective. Unilateral lesion of the vestibular nuclei or bilateral lesions limited to the superior and lateral vestibular nuclei, however, did not prevent the appearance of the REM.

A66-81577

INFLUENCE OF SLEEP AND WAKEFULNESS ON THE RESPONSE OF LATERAL GENICULATE UNITS TO SINEWAVE PHOTIC STIMULATION.

L. Maffei, G. Moruzzi and G. Rizzolatti (Pisa U., Ist. di Fisiol. and Consiglio Nazl. della Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Sez. di Pisa, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 596-608. 30 refs.

Grant AF EOAR 64-37

Units of the lateral geniculate body (LGB) were recorded in the unanesthetized, midpontine pretrigeminal cat. A sine-wave oscillation of light intensity, at different frequencies (from 0.1 to 1 c.p.s.), was used for visual stimulation. During behavioral and electroencephalogram (EEG) wakefulness the

firing of LGB units is modulated by the sinewave light in an almost linear fashion. The oscillation of the firing rate appears to be a perfect replica of the sinewave. The "on" cells are in phase with the stimulus, the "off" cells are 180° out of phase; and the "on-off" cells present a stimulus response phase relationship between 0 and 180°. During synchronized sleep every relation between sinewave stimulus and response disappears. Control experiments, as well as several considerations, suggest that the hypnic "escape" of LGB units from the modulating influence of sinewave light may be due to the withdrawal of extraretinal volleys, possibly mediated by reticulogeniculate pathways.

A66-81578

EFFECT OF SYNCHRONIZED SLEEP ON THE RESPONSE OF LATERAL GENICULATE UNITS TO FLASHES OF LIGHT.

L. Maffei and G. Rizzolatti (Pisa U., Ist. di Fisiol. and Consiglio Nazl. delle Ric., Centro di Neurofisiol. e Gruppo d'Elettrofisiol., Pisa, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 609-622. 29 refs.
Grant AF EOAR 64-37.

Units of the dorsal part of the lateral geniculate body (LGB) were recorded in the midpontine pretrigeminal cat. Flashes of light of 100-300 nsec. in duration were applied every ten seconds, after eliminations of the causes of error due to pupillary changes and eye movements. The LGB unit responsiveness to light flashes was calculated as signal to noise ratio (where the signal is the response correlated with the stimulus, and noise is the spontaneous activity before the stimulus). The LGB unit responsiveness result was always greater during behavioral and electroencephalogram (EEG) alertness, independently from the changes of the background firing. A light pulse, decreased by means of neutral filters to a point which could still evoke a clear-cut response during wakefulness, became ineffective during synchronized sleep. It was necessary to increase the intensity of the stimulus more than ten times to evoke a response. Control experiments have shown that this difference between sleep and wakefulness is not retinal in origin. The hypothesis of an inhibitory mechanism acting through interneurons on LGB units is discussed as a possible explanation of the striking decrease of responsiveness found during synchronized sleep.

A66-81579

TRANSMISSION OF TONIC ACTIVITY THROUGH LATERAL GENICULATE BODY AND VISUAL CORTEX.

A. Arduini and A. Cavaggoni (Parma U., Ist. di Fisiol., Italy). *Archives Italiennes de Biologie*, vol. 103, Dec. 10, 1965, p. 652-667. 40 refs.

Grant AF EOAR 64-48 and Consiglio Nazl. delle Ric. supported research.

In the barbiturate-anesthetized cat the transfer functions for the lateral geniculate body and visual cortex were determined for tonic activity in dark and light adaptation, by recording simultaneously from chiasma, geniculo-cortical radiations, and corticothalamic projections. Geniculate transfer functions remained fairly constant for all values of input activity tested, while the cortical transfer functions showed a definite tendency to increase with decrease of the input. The behavior of the cortical transfer functions is interpreted as determined by the non-specific inputs to cortical neurons. The effects of injecting Nembutal seem to support this hypothesis.

A66-81580

PATTERNS OF CENTRAL NEURONS RESPONSES TO SUSPECTED TRANSMITTERS.

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Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 705-724. 36 refs.

The responsiveness of individual neurons in the cat's spinal cord, medulla, thalamus, hypothalamus, hippocampus, septum, caudate, red and cuneate nuclei, and sensory motor cortex, and in the rabbit's olfactory bulb to the suspected central transmitters acetylcholine (ACh), norepinephrine (NE) and serotonin (5-HT) was investigated through the electrophoretic administration of these drugs from the tip of 5-barreled glass micropipette electrodes, directly at the site of extracellular unit recording. The ratio of responsive to unresponsive units for any one of these three substances varied in different central nervous system (CNS) regions and was influenced by several biological and technical factors. In addition to Renshaw cells, other units in segments L₅, L₆, and L₇ of the spinal cord showed responsiveness to these three substances. In the spinal cord, as in all other CNS regions explored, responses were usually slower in onset and longer in duration than Renshaw cell responses to ACh. Renshaw cells always exhibited a quick response to ACh in the direction of facilitation and a slow response to NE, more often in the direction of depression than of facilitation. Each of the three suspected transmitters can cause either facilitation or depression of unit spontaneous activity depending upon the type of unit investigated. Hippocampal pyramidal and pyramidal tract neurons were consistently facilitated by ACh and, when sensitive to NE and 5-HT, were consistently depressed by these two substances. Mitral cells in the rabbit olfactory bulb were consistently depressed by NE and also by ACh and 5-HT when sensitive to these. Deiters nucleus neurons were consistently facilitated by both ACh and NE. Facilitatory and depressant responses interacted. The data available from the study of several thousand neurons in various regions of the mammalian brain lead to the conclusion that a "typical" central neuron response to any one of the three suspected transmitters does not and can not exist because of the many different biological factors that contribute to the response of each unit to the test substances.

A66-81581

BRAIN STEM-LIMBIC CONNECTIONS AND THE ELECTROGRAPHIC ASPECTS OF DEEP SLEEP IN THE CAT.

G. Carli, V. Armengol, and A. Zanchetti (Siena U., Ist. di Patol. Med. and Consiglio Nazl. delle Ric., Impresa di Elettrofisiol., Siena, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 725-750. 43 refs.

Contract AF EOAR 64-41; and Consiglio Nazl. delle Ric. supported research

Lesions which interrupt the ascending limb of the mid-brain-limbic circuit in the cat at different levels, or which even destroy it completely, do not prevent electroencephalographic desynchronization at the beginning of periods of deep sleep, nor do they affect the maintenance of desynchronization throughout the deep sleep episodes. Likewise, none of the lesions to ascending limbic pathways abolishes or impairs the appearance of a hippocampal theta rhythm at the beginning of each deep sleep episode, and its regular maintenance throughout its duration. Lesions involving the course or termination of various descending components of the limbic-midbrain circuit do not prevent or modify any of the classical signs of deep sleep, including the appearance of spiky waves in the pontine tegmentum shortly before and throughout each

deep sleep period. It is concluded that neither the ascending nor the descending component of the limbic-midbrain circuit exert any essential role in deep sleep behavior.

A66-81582

A STUDY OF PONTINE LESIONS SUPPRESSING DEEP SLEEP IN THE CAT.

G. Carli and A. Zanchetti (Siena U., Ist. di Patol. Med., and Consiglio Nazl. delle Ric., Siena, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 751-788. 14 refs.

Grant AF EOAR 64-41; and Consiglio Nazl. delle Ric. supported research.

Experiments were performed on cats carrying implanted recording electrodes in the skull and neck, whose sleeping behavior was long studied both before and after lesions in the caudal midbrain and in the pons. Complete destruction of various structures in the caudal midbrain and in the pons did not prevent deep sleep from repeatedly occurring. In none of the cats with loss of deep sleep was the nucleus reticularis pontis caudalis markedly injured. Loss of deep sleep for at least four consecutive days, and often for longer periods, was constantly associated with lesions in the nucleus reticularis pontis oralis. However, only when the largest extent of the brain stem lesion involved the mediolateral portions of the middle, and perhaps the posterior, of the three rostrocaudal sections in which the nucleus reticularis pontis oralis was divided, was deep sleep long suppressed in all its various manifestations. Lesions limited to either the medial or the lateral portions of the nucleus reticularis pontis oralis at any rostrocaudal level, or even severely involving the anterior third but affecting to a lesser degree the middle one, were always compatible with the maintenance of deep sleep. It is suggested that the neurons responsible for inducing deep sleep are mainly concentrated in the mediolateral portions of the middle, and perhaps the posterior, thirds of the nucleus reticularis pontis oralis.

A66-81583

BLOOD PRESSURE AND HEART RATE DURING NATURAL SLEEP ON THE CAT AND THEIR REGULATION BY CAROTID SINUS AND AORTIC REFLEXES.

M. Guazzi and A. Zanchetti (Siena U., Ist. di Patol. Med., and Consiglio Nazl. delle Ric., Siena, Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 789-817. 28 refs.

Grant AF EOAR 64-41; and Consiglio Nazl. delle Ric. supported research.

Blood pressure and heart rate changes during the wakefulness-sleep cycle were studied in 24 unanesthetized free-moving cats, carrying an implanted cannula in a femoral artery as well as electrodes for electroencephalographic, electromyographic, and eye movement recording. In 14 animals sino-aortic deafferentation was performed. Quantitative evaluation of all data was carried out by analysis of variance. Both in intact and in deafferented animals, light sleep was accompanied by a slight but definite decrease in systolic and diastolic pressures, and in heart rate. While both arterial pressure and heart rate showed a consistent trend to increase toward the end of light sleep and at the very beginning of deep sleep, a large fall in arterial pressure and heart rate were always observed during deep sleep. Blood pressure and heart rate were also more variable during deep than during light sleep. Systolic and diastolic pressures, as well as heart rate, were significantly higher in deafferented than in intact animals both during quiet wakefulness and throughout light sleep. However, such surprisingly large falls in pressure were recorded during

the course of deep sleep episodes that arterial pressure finally attained much lower absolute values in deafferented than in intact animals. In several incidents of the lowest values of blood pressure, episodes of transient cerebral ischemia (electroencephalographic flattening and seizures) occurred. Unlike arterial pressure, heart rate, though markedly decreased, remained at slightly higher values in deafferented than in intact animals even during deep sleep. The role of pressoreceptive and of chemoceptive reflex mechanisms in regulating the circulation during natural sleep is discussed.

A66-81584

INDUCTION OF EEG DESYNCHRONIZED SLEEP BY ELECTRICAL STIMULATION OF THE NEOCORTEX.

M. Di Paola, G. F. Rossi, and J. Zattoni (Genova U., Clin. Neurochir., Italy).

Archives Italiennes de Biologie, vol. 103, Dec. 10, 1965, p. 818-831. 42 refs.

Grant AF EOAR 65-4; and Consiglio Nazl. delle Ric. supported research.

The effects of cortical stimulation on the occurrence of episodes of electroencephalogram (EEG) desynchronized sleep were studied in chronic experiments, performed on free-moving cats. The following neocortical areas were explored: anterior and posterior sigmoid gyri, anterior and posterior lateral gyri, suprasylvian gyrus, anterior sylvian gyrus, and anterior ectosylvian gyrus. Arousal from sleep as well as induction of the EEG desynchronized phase of sleep were obtained following cortical stimulations performed during EEG synchronized sleep. The type of the response was dependent on the general conditions of the animal at the moment of the stimulation: when the stimulation was performed at the beginning of sleep, arousal occurred; while, when the cortical stimulus was applied during a well-developed EEG synchronized stage of sleep, an EEG desynchronized episode was obtained. The physical parameters of stimulation did not influence the type of the response. The EEG desynchronized sleep was obtained by all the cortical areas stimulated; the arousing effect by most, but not by all of them. These results might suggest, but do not prove, a phasic cortical participation in the mechanisms underlying the onset of the EEG desynchronized phase of sleep.

A66-81585

SIGNIFICANCE IN TRANSPORTATION MEDICINE OF DIFFERENTIAL NOISE SUSCEPTIBILITY AS RELATED TO AGE IN DIESEL ENGINEERS [VERKEHRSMEDIZINISCHE BEDEUTUNG DER UNTERSCHIEDLICHEN LÄRMEMPFINDLICHKEIT IN ABHÄNGIGKEIT VOM LEBENSALTER FÜR DIESELLOKFÜHRER].

W. Kup and G. Lessing (Städtisches Klin., Hals-Nasen-Ohren-Klinik, and Zentral-Inst. für Verkehrswesen, Berlin, East Germany).

Verkehrsmedizin und ihre Grenzgebiete, vol. 13, Apr.-May 1966, p. 147-160. 15 refs. In German.

A total of 1,198 railroad workers whose hearing had been damaged by industrial noise after being separated into two age groups (Group A aged below, and Group B above 35) were investigated. Hearing damage was found to be incurred much more rapidly among the older than among the young individuals. Group B suffered hearing loss as early as 6 years after exposure, while the same levels of hearing loss were reached 10 and 15 years after exposure in Group A. From these findings it is deduced that older people should be excluded from high-noise working conditions. Minimum hearing loss threshold curves are drawn, arranged by age groups up to 50 years, to illustrate the point. The findings are related to conditions that apply in the change-over from steam to diesel engine operation.

A66-81586

MOTILITY AND BODY TEMPERATURE IN MICE AT VARIOUS ENVIRONMENTAL TEMPERATURES [MOTILITÄT UND KÖRPERTEMPERATUR VON MAUSEN IN VERSCHIEDENEN UMGEBUNGSTEMPERATUREN].

D. Doss and F. K. Ohnesorge (Kiel U., Inst. für Pharmakol., West Germany).

Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 2, 1966, p. 91-97. 10 refs. In German.

Mice were kept single for 2-1/2 hours in ambient temperatures of 15, 20, 25, 30, and 35°C. Motility and body temperature change under these circumstances were examined. In an ambient temperature of 15-25°C. the average body temperature was 36.6°C. It rose to 38.8°C. at 35°C. The motor activity was minimal at 25°C. It rose at lower and higher ambient temperatures. The percentage of quiet mice increased with rising temperature up to 25°C., but decreased at ambient temperatures higher than 25°C. The relationship between motor activity and body temperature was linear at all ambient temperatures. The effect of motor activity on the body temperature was more pronounced in cool surroundings than in warm ones.

A66-81587

OXYGEN CONSUMPTION IN MICE AT VARIOUS ENVIRONMENTAL TEMPERATURES [DER SAUERSTOFFVERBRAUCH VON MAUSEN IN VERSCHIEDENEN UMGEBUNGSTEMPERATUREN].

P. Müller-Beissenhirtz and F. K. Ohnesorge (Kiel U., Inst. für Pharmakol., West Germany).

Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 2, 1966, p. 98-108. 8 refs. In German.

The relationship between oxygen consumption and motor activity in normal mice, which were kept in ambient temperatures of 15, 20, 25, 30, and 35°C. for 2-1/2 hours, is reported. A linear relationship existed between motor activity and oxygen consumption at all ambient temperatures. The regression coefficients were equal at ambient temperatures of 20, 25, and 30°C.; they were higher at 15 and 35°C. The oxygen consumption decreased linearly with rising ambient temperature. The oxygen consumption was minimal at 30°C. and rose again at 35°C. At all ambient temperatures a linear correlation was observed between body weight and oxygen consumption. The effect of body weight on the oxygen consumption increased with decreasing ambient temperature. It was minimal at 30°C and rose again at 35°C.

A66-81588

ON THE MECHANISM FOR BRADYCARDIA INDUCED BY ACUTE SYSTEMIC ANOXIA IN THE DOG.

J. Litwin and K. Skolasińska (School of Med., Dept. of Human Physiol., Warsaw, Poland).

Pflügers Archiv für die gesamte Physiologie, vol. 289, no. 2, 1966, p. 109-121. 24 refs.

The effects of acute systemic anoxia on heart rate were investigated in 46 anesthetized, artificially ventilated and spontaneously breathing dogs. Severe anoxia produced by inhalation of 100% nitrogen over a period of 1 to 3 min. elicited in both groups of animals a biphasic response consisting of a primary tachycardia and secondary bradycardia. Whereas primary tachycardia was usually moderate, secondary bradycardia was very pronounced and amounted to a 45.8% reduction of heart rate in artificially ventilated dogs, and to 67.2% in dogs breathing spontaneously. Bilateral cervical vagotomy, atropinization and ganglionic blockage caused consistently a considerable reduction or abolition of anoxic

bradycardia. On the contrary, elimination of the sympatho-adrenal system by means of spinal cord destruction and bilateral adrenalectomy was conducive to an evident enhancement of bradycardia. The intensity of bradycardia was not reduced following denervation of carotid and aortic baro- and chemo-receptors. On the contrary, denervation invariably resulted in a considerable increase of bradycardia. It is concluded that secondary anoxic bradycardia is mainly due to the increased tone of the vagal cardioinhibitory center, the local depressant action of anoxia on the heart itself being of minor importance. Increased vagal tone is opposed by the concomitant stimulation of the sympatho-adrenal system. Anoxic bradycardia cannot be regarded as resulting from stimulation of carotid and aortic receptors. It is, therefore, inferred that some other mechanism, reflex or central, is activated during acute systemic anoxia giving rise to the increased vagal discharge to the heart.

A66-81589

NEW TECHNOLOGY, NEW DANGER, NEW WORK SAFETY DEVICES: PREVENTION OF HEALTH DAMAGE IN THERMIC DECOMPOSITION OF CHLORINE AND SYNTHETIC RUBBER (BUNA) BASED LACQUERS [NEUE TECHNIK—NEUE GEFAHR—NEUE ARBEITSSCHUTZMITTEL: DIE VERHÜTUNG VON GESUNDHEITSSCHADEN BEI DER THERMISCHEN ZERSETZUNG VON CHLORBUNAEINHEITSLACK].

F. Vollbrecht (Bezirks-Hyg.-Inst., Berlin, East Germany).

Verkehrsmedizin und ihre Grenzgebiete, vol. 12, Aug.-Sep. 1965, p. 467-484. 64 refs. In German.

Varnishes composed of chlorine and synthetic rubber are used widely in industry because they can be used for both priming and finishing. They are very adhesive while preserving their flexibility. They should not be used in small and closed-in localities because they are heat resistant only up to 80°C. When sheet metals and metal parts painted with these varnishes are subjected to unbuckling and welding operations, various toxic gases and vapors are developing; such as hydrochloric acid, trichloroethylene (from the solvent), hydrocyanic acid, and traces of chlorine, as well as acrolein and considerable amounts of paint dust. Inhalation of these substances leads to a combination of irritative injuries (respiratory ducts, conjunctiva, and gastric mucosa) and toxic symptoms (gastritis combined with hypersecretion, and skin irritation). A protective helmet to prevent these injurious effects is described.

A66-81590

RELATIONSHIP BETWEEN PULMONARY VENTILATION AND RESPIRATORY QUOTIENT IN INTENSE MUSCULAR WORK [RELAZIONE TRA VENTILAZIONE POLMONARE E QUOZIENTE RESPIRATORIO NEL LAVORO MUSCOLARE INTENSO].

G. Brandi (Modena U., Ist. di Fisiol. Umana, Italy).

Bollettino della Società Italiana di Biologia Sperimentale, vol. 42, Feb. 28, 1966, p. 169-172. In Italian.

Consiglio Nazl. delle Ric. sponsored research.

Three healthy male subjects performed on an ergometer muscular work that carried them to exhaustion within 2-8 minutes. When exhaustion occurred within 2-4 min., alveolar CO₂ pressure (PACO₂) increased progressively within the first two minutes and remained constant thereafter. When the work was exhaustive in 5-8 min., a progressive decrease of PACO₂ after about 4 min. was observed, while the first phase was about identical to that observed in the more exhaustive work. The physiological mechanism underlying the findings is discussed with a particular view to their relationship with arterial carbon dioxide pressure changes and respiratory quotient. It

is concluded that the increase of the latter is interrelated to the lowering of arterial CO_2 pressure and not to lactic acid metabolism.

A66-81591

EFFECT OF CYSTAMINE AND S. BETA-AMINOETHYLISOTHIURONIUM ON II-DESOXYRIBONUCLEASE ACTIVITY IN RADIOSENSITIVE ORGANS OF RATS IRRADIATED WITH DOSES OF 350 AND 100 r [VLIJANIE TSISTAMINA I S. BETA-AMINOETILIZOTIURONIIA NA AKTIVNOST' DEZOKSIRIBONUKLEAZY II V RADIOCHUVSTVITEL' NYKH ORGANIKH KRYIS, OBLUCHENNYKH V DOZAKH 350 I 100 R].

N. I. Libikova (S. M. Kirov Mil.-Med. Acad., Leningrad, USSR). *Radiobiologiya*, vol. 6, no. 2, 1966, p. 166-169. 20 refs. In Russian.

In rats exposed to X-ray radiation in doses of 100 r and 350 r, the deoxyribonuclease (DNA-ase) activity of spleen and thymus gland was estimated by the Dische colorimetric test of urine for the presence of low-molecular fractions of deoxyribonucleic acid (DNA) degradation. Enzyme activity was increased after X-ray irradiation. Injection of the radiation protective compounds, cystamine hydrochloride (90 mg./kg.) and S- β -aminoethylisothiuronium bromide (250 mg./kg.) immediately before irradiation exposure decreased the DNA-ase activity in spleen and thymus gland.

A66-81592

NEUTRON IRRADIATION INFLUENCE ON METABOLIC PROCESSES IN TISSUES [DEISTVIE NEITRONNOGO OBLUCHENIIA NA PROTSESSY TKANEOVOGO OBMENA]. L. S. Cherkasova, F. D. Koldobskaia, V. A. Kukushkina, T. M. Mironova, V. G. Remberger, M. IU. Taits, and K. V. Fomichenko (Belorussian SSR, Acad. of Sci., Inst. of Physiol., Minsk).

Radiobiologiya, vol. 6, no. 2, 1966, p. 179-184. 9 refs. In Russian.

Whole-body irradiation of rats by neutrons, about 13 rad, caused a shift in the carbohydrate-energy exchange and protein turnover of the central nervous system, skeletal muscles, and liver. Radiation affected glycogen synthesis and utilization in brain and muscle tissues. Changes were noted in the intermediary phosphorus-containing units of carbohydrate metabolism. The adenosine triphosphate (ATP) content of muscle tissue was increased 15 days after the exposure. The protein synthesis of central nervous system and liver was stimulated. These changes persisted 30 days after radiation exposure, which indicated a sustained effect of radiation on the general function of the organism.

A66-81593

DISTURBANCE OF REGULATION OF SECRETORY STOMACH ACTIVITY BY BLEEDING IN ANIMALS SUFFERING FROM RADIATION SICKNESS [NARUSHENIE REGULIATSII SEKRETORNOI DEIATEL'NOSTI ZHELUDKA PRI KROVOPOTERE U ZHIVOTNYKH, STRADAIUSHCHIKH OSTROI LUCHEVOI BOLEZN'IU SREDNEI TIAZHESTI].

M. G. Mikaelian.

Radiobiologiya, vol. 6, no. 2, 1966, p. 210-213. In Russian.

In dogs with isolated stomachs, induced hemorrhage, resulting in blood loss of 4% of each animal's body weight, caused a temporary lowering of hydrochloric acid level and enzyme activity of gastric juice, and a change in the latent period of its formation. It also caused changes in reflex-complex and neurohumoral regulation of secretion. Exposure of animals to radiation (600 r) caused waveform changes in gastric secretion, that is, alternating periods of hyper- and hypo-secretion.

When irradiation was followed by hemorrhage more severe changes were noted in secretory regulation of gastric glands, both reflex-complex and neuro-humoral phases. At the peak of radiation sickness, structural changes in the gastric secretory cells and in local nerves were also noted. After irradiation alone all animals recovered, but the combination of irradiation and hemorrhage caused early death.

A66-81594

DISTURBANCES OF STRUCTURE AND FUNCTION OF ISLANDS OF LANGERHANS BY RADIATION SICKNESS INDUCED BY RADIOACTIVE STRONTIUM [NARUSHENIE STRUKTURY I FUNKTSII OSTROVKOV LANGERGANSIA PODZHELUDOCHNOI ZHELEZY PRI LUCHEVOI BOLEZNI, VYZVANNOI RADIOAKTIVNYM STRONTSIEM].

O. A. Khomutovskii (USSR, Acad. of Sci., A. A. Bogomol'ts Inst. of Physiol., Kiev).

Radiobiologiya, vol. 6, no. 2, 1966, p. 214-218. 12 refs. In Russian.

Histological studies of pancreas sections and the delayed recovery curve of sugar tolerance indicated a mild form of induced diabetes in guinea pigs which were injected intraperitoneally with $\text{Sr}^{89}\text{Cl}_2$ and $\text{Sr}^{90}\text{Cl}_2$. In animals sacrificed several weeks after the injection, the sections of islands of Langerhans showed a distortion of tissue regeneration. There was a proliferation of abnormal type of beta-cells, epithelium of the secretory ducts, and connective tissue. Beta-cells had deformed structure with atypical organelles. In the early stages of radiation sickness, the damaging effect of beta-decay was proportional to the amount of absorbed energy. In later stages the disturbance of regenerative process depended on the level of chronic irradiation, but was not affected by the amount of absorbed energy.

A66-81595

DISTURBANCE OF ADAPTABILITY OF BLOOD COAGULATION SYSTEM BY RADIATION INJURIES [NARUSHENIE ADAPTATSIONNYKH VOZMOZHNOSTEI SISTEMY SVERTYVANIYA KROVI PRI LUCHEVYKH POROZHENIIAKH]. I. A. Andrushko and D. M. Zubairov (Kazan State Med. Inst., USSR).

Radiobiologiya, vol. 6, no. 2, 1966, p. 224-226. 18 refs. In Russian.

In normal rabbits induced blood loss caused a sharp decrease in clotting time, which normalized within 30 minutes. No thromboplastic activity change was noted. In animals which survived radiation exposure of 800 r, the thromboplastic activity was considerably lower than normal, but the thrombocyte number did not change. The capillary permeability was less than normal. After blood loss these animals showed a slight shortening of clotting time, and a decrease in number of thrombocytes and erythrocytes. It appears that ionizing radiation causes a disturbance in the normal clotting mechanism to compensate for blood loss.

A66-81596

INVESTIGATION OF LOCAL AND DISTANT IRRADIATION INFLUENCE ON PROLIFERATIVE ACTIVITY OF MARROW CELLS [ISSLEDOVANIE MESTNYKH I DISTANTSIONNYKH VLIJANII RADIATSII NA PROLIFERATIVNUIU AKTIVNOST' KLETOK KOSTNOGO MOZGA].

M. I. Ianushevskaya and N. F. Barakina (USSR, Acad. of Sci., A. N. Severtsov Inst. of Animal Morphol., Moscow).

Radiobiologiya, vol. 6, no. 2, 1966, p. 237-240. 10 refs. In Russian.

In mice irradiated by 200–1000 r, the suppression of mitotic activity of bone marrow was directly dependent on the radiation dose. This dependence was not obvious during the first 24 hrs. after exposure, but was definite in the following days. The degree of this effect was small in the adjacent areas containing hemopoietic tissues, and did not depend on the type of tissue irradiated. The normalization of mitotic activity occurred rapidly in some hemopoietic areas which were not exposed to radiation; this can be explained by the migration of undamaged cells into the affected area, and by the influences of humoral factors produced in unaffected regions.

A66-81597

FUNCTION OF RAT THYROID GLAND BY REPEATED IRRADIATION AND MERCAMINE INJECTION [FUNKTSIIA SHCHITOVIDNOI ZHELEZY KRYSA PRI POVTORNYKH OBLUCHENIIAKH I VVEDENII MERKAMINA].

P. I. Lomonos and P. S. Pivanova (USSR, Acad. of Med. Sci., Inst. of Exptl. Med., Leningrad).

Radiobiologiya, vol. 6, no. 2, 1966, p. 246–249. 8 refs. In Russian.

Thyroid function declined in rats subjected to 800 r X-ray radiation. The curve of uptake and release of iodine-131 showed a delayed maximal absorption point. Exposure to 67 r, followed by 800 r 14 days later caused a decrease in the absorption of radioactive iodine. When the first dose was 200 r, the level of absorbed iodine was higher than that after the single dose. Injections of mercamine (150 mg./kg.) 15 minutes before irradiation (800 r) caused a decline of thyroid function without changing the character of the curve. Mercamine injection between the first exposure (67 r) and the second (800 r) sharply increased the thyroid function. However, when the first dose was 200 r, the function was sharply decreased.

A66-81598

REFLEXES FROM MECHANORECEPTORS OF UPPER RESPIRATORY TRACTS BY RADIATION SICKNESS [REFLEKSY S MEKHANORESEPTOROV VERKHNIKH DYKHADEL'NYKH PUTEI PRI LUCHEVOI BOLEZNI].

R. A. Fel'berbaum and L. N. IAmol'skii (Min. of Agr., Leningrad Sci.-Res. Inst. of Eye, Ear, Nose Diseases, and Speech, USSR).

Radiobiologiya, vol. 6, no. 2, 1966, p. 250–253. 20 refs. In Russian.

Cats were exposed to 400 r radiation in order to induce radiation sickness, which was demonstrated 3–16 days later by loss of about 1/8 or 1/10 of the original body weight and reduction of leucocyte count by 1/2 or 1/3. Examination of bone marrow showed hyperemia and irritation, and necrosis of the hematopoietic tissues. In later stages proliferation of reticular forms was noted. In normal animals stimulation of mechanoreceptors of trachea and area of vocal chords caused primarily the pressor reaction of blood pressure, and a slowing or a temporary arrest of respiration. During radiation sickness, 3–7 days after exposure, stimulation caused a considerable decrease of the arrest of respiration and a two-phase effect on the blood pressure. The first phase of depressor action was followed by a considerable pressor action. The threshold of mechanoreceptors was sharply elevated, which indicated a disturbance in the reflex function of the upper respiratory tract.

A66-81599

COMPARATIVE ESTIMATION OF RADIOPROTECTIVE EFFECTIVENESS OF POTENTIAL RADIOPROTECTORS—BUNTE'S SALTS—ON DIFFERENT BIOLOGICAL MODELS [SRAVNITEL'NAIA OTSENKA ZASHCHITNOI EFFEKTIVNOSTI POTENTSIAL'NYKH RADIOPROTEKTOROV—SOLEI BUNTE—NA RAZLICHNYKH BIOLOGICHESKIKH MODELIKAKH].

IU. B. Kudriashov, M. L. Kakushkina, S. M. Mekhtieva, F. IU. Rachinskii, G. V. Sumarukov, and O. F. Filenko (M. V. Lomonosov Moscow State U., USSR).

Radiobiologiya, vol. 6, no. 2, 1966, p. 272–277. 10 refs. In Russian.

Relative radiation protective effect of several Bunte salts (sodium alkyl thiosulfates) was tested in mice, human erythrocytes, yeast cells, and oleic acid solutions of beta-carotene. A radiomimetic, oxidized oleic acid, was used for radiation effect. The radiation protectors with which the Bunte salts were compared were aminothiols and aminodisulfides. Beta-mercaptoethylamine was used as a unit of radiation protection activity. The results showed a variance in the effect of different Bunte salts on the same system or in different biological subjects. This method can be used as a preliminary test for radiation protectors. The effect can be estimated in 2–3 hrs. after radiation exposure of a cell. In animals the lowering of the oxidation-reduction potential in muscle due to injected compounds prior to irradiation can serve as an indicator of the effectiveness of the radiation protectors.

A66-81600

REVERSIBILITY OF HEPATIC FIBROSIS INDUCED BY CARBON TETRACHLORIDE IN THE RAT.

F. Varga, Gy. Méhes, and Z. Molnár (U. Med. School, Inst. of Pharmacol., Pécs, Hungary).

Acta Physiologica Academiae Scientiarum Hungaricae, vol. 29, no. 1, 1966, p. 69–74. 22 refs.

The concentration of hydroxyproline in the liver of rats treated with 1 ml./kg. of carbon tetrachloride subcutaneously twice weekly for 6, 12, 18 and 24 weeks rose to the 1.5, 2.3, 3.5, and 4.0-fold, respectively, of the control value (255 µg./g.). Hydroxyproline concentration returned to normal after 3 weeks in the animals treated for 6 weeks, but was still high 3 months after the last injection in the animals treated for more than 6 weeks. Although in the 12, 18 and 24-week groups hepatic hydroxyproline concentration diminished by 30 to 40% in 1 to 3 weeks after the last injection, the decrease stopped thereafter and the level remained unchanged for one or two months. Treatment with 10 mg./kg. of hydrocortisone 3 times weekly did not enhance resorption of collagen. Hepatic function returned to normal in 2 to 3 weeks after termination of the carbon tetrachloride treatment, irrespective of its duration. No parallelism was observed between the reversibility of fibrosis and the regeneration of the hepatic parenchyma.

A66-81601

COGNITIVE TEST PERFORMANCE UNDER LSD-25, PLACEO AND ISOLATION.

Leo Goldberger (N. Y. U., Res. Center for Mental Health, New York).

Journal of Nervous and Mental Disease, vol. 142, Jan. 1966, p. 4–9. 11 refs.

Contract AF 33(616)-6103 and Grant Natl. Inst. of Mental Health K3-MH-16.734.

Comparison between the effects of (100 gamma) LSD-25 and the effects of eight hours of perceptual isolation revealed in a group of normal subjects only a limited convergence in

subjective experience as measured on a questionnaire. Comparing cognitive test performance, it was found that LSD produced significant impairment on eight out of nine tests, while isolation did not produce impairment on a single test, as compared with either the LSD or the placebo group. It is suggested that isolation may produce a weakened ability to initiate and sustain internally-motivated tasks, but that efficient "secondary process" functioning is quickly reinstituted as soon as an externally-initiated task is presented.

A66-81602

ORGAN AND CELLULAR DEVELOPMENT IN MICE GROWING AT SIMULATED HIGH ALTITUDE.

Richard L. Naeye (Vt. U., Coll. of Med., Dept. of Pathol., Burlington).

Laboratory Investigation, vol. 15, Apr. 1966, p. 700-706. 19 refs.

Grant Natl. Heart Inst. HE 06469-04.

A marked growth retardation was observed in mice residing in a hypoxic environment. A similar retardation was found in growing mice subjected to alimentary undernutrition. Quantitative histologic analysis revealed organ abnormalities in the hypoxic mice quite different from those associated with undernutrition. In the hypoxic mice, organs were small because they had a subnormal number of cells while in the undernourished animals, organs were small primarily because their individual cells had a subnormal mass of cytoplasm. These structural differences can be correlated with physiologic differences in the two groups.

A66-81603

STUDIES ON THE METABOLISM OF CARBON MONOXIDE.

Kimmo Luomanmaki (Pa. U., School of Med., Graduate Div., Dept. of Physiol., Philadelphia and Wihuri Res. Inst., Helsinki, Finland).

Annales Medicinæ Experimentalis et Biologiæ Fenniae, vol. 44, Supplement 2, 1966, 55 p. 106 refs.

The oxidation of CO, its endogenous formation, and its distribution between the two major CO pools was investigated in anesthetized dogs. The oxidation of CO was studied by means of ^{14}CO as a tracer. The average fractional oxidation rate of ^{14}CO was $0.30 \pm 0.18\%$ of the tracer dose per hour. Measurements in two humans yielded values within the lower range of those observed in dogs. No significant correlation existed between the fractional oxidation rates and the carboxyhemoglobin (COHb) level. There was a significant positive linear correlation between the calculated absolute oxidation rates and the COHb level, suggesting a first order reaction in the COHb range of 1-35%. The oxidation rate was not detectably affected by changing P_{O_2} . Measurement of the detectable rate of endogenous formation of CO showed that the equilibrium between the rate of endogenous formation and the oxidation of CO was reached at COHb 10%. The distribution of CO between the hemoglobin pool and the myoglobin pool seemed to depend only on the relative amounts of these proteins in a wide range of COHb and P_{O_2} .

A66-81604

OBSERVABILITY OF INDIGENOUS ORGANIC MATTER ON THE MOON.

J. J. Gilvarry (NASA, Ames Res. Center, Space Sci. Div., Moffet Field, Calif.)

Icarus, vol. 5, May 1966, p. 228-236. 39 refs.

Natl. Acad. of Sci.-Natl. Res. Council supported research.

The theories of Gilvarry and Sagan implying the presence of indigenous organic matter on the Moon are reviewed. The

former postulates the presence in the lunar maria of organic remains derived from a pristine biota. The latter assumes the presence of organic matter on the lunar highlands, now covered by meteoritic infall, formed by the action of solar ultraviolet light and other agencies on a reducing protoatmosphere. However, that meteoritic infall on a moon without an atmosphere causes a net loss of mass from that body is postulated in the two theories. On Gilvarry's model, a loss of mass from the lunar surface of at least seven meters in depth is found and future lunar explorers should find organic fossils below the depth of roughly three to five meters fixed by the charring action of the most penetrating radiation, the cosmic rays. Self-consistently on Sagan's theory, no over-all gain of mass by meteoritic action on the Moon could occur, which is at variance with his conclusion of a depth of burial of organic vestiges amounting to some tens of meters. The actual loss of mass on the model after the lunar atmosphere vanished would be at least 10 meters in depth, and hence the organic remains postulated as superficially distributed at a remote time would be completely unobservable at present.

A66-81605

MATURATION OF A STRESS-ACTIVATED MECHANISM INHIBITING INDUCTION OF TYROSINE TRANSAMINASE.

Shawn Schapiro (Calif. U., Dept. of Psychiatry, Los Angeles), Arthur Yuwiler and Edward Geller (Veterans Admin. Center and Calif. U., Dept. of Psychiatry, Los Angeles).

Science, vol. 152, Jun. 17, 1966, p. 1642-1643. 9 refs.

Grants PHS AM-06603-04 and AM-08775-02.

Rats of various ages were subjected to the stress of 30 minutes on a noisy reciprocating shaker four hours before their liver tyrosine transaminase and tryptophan pyrrolase activities were measured. Adrenalectomized infants and adults and hypophysectomized adults were also stressed. Intact, stressed infants exhibited an increase in tyrosine transaminase activity, while intact, stressed adults showed no change. In the stressed adrenalectomized adult, tyrosine transaminase showed no change. In the stressed adrenalectomized adult, tyrosine transaminase activity markedly decreased, while adrenalectomized infants showed no change. Hypophysectomy largely, but not completely, abolished inhibition in the adults. Tryptophan pyrrolase activity, when present, was increased by stress in all age groups, but the increase was abolished by adrenalectomy and hypophysectomy. The results suggest stress-activation of a pituitary mechanism that inhibits or represses activation of tyrosine transaminase and that may not function during early postnatal life.

A66-81606

EYE AND HEAD MOVEMENTS IN PERIPHERAL VISION: NATURE OF COMPENSATORY EYE MOVEMENTS.

Albert E. Bartz (Concordia Coll., Dept. of Psychol., Moorhead, Minn.)

Science, vol. 152, Jun. 17, 1966, p. 1644-1645. 5 refs.

Grant PHS AC 00165.

Simultaneous recordings of both eye and head movements in response to a peripheral signal indicated that the backward compensatory eye movement was initiated during the constant velocity of the head rotation. This compensatory movement began before the eyes had actually reached the peripheral signal.

A66-81607

ELECTROENCEPHALOGRAPHIC ANALYSIS OF ASCENDING ACTIVATION OF THE BRAIN IN PROLONGED STARVATION [ELEKTROENTSEFALOGRAFICHESKII ANALIZ VOSKHODIASHCHEI AKTIVATSII GOLOVNOGO MOZGA PRI DLITEL'NOM GOLODANII].

A. A. Panfilov and T. N. Loseva (I. M. Sechenov First Med. Inst., Dept. of Normal Physiol., Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 52, May 1966, p. 447-452. 20 refs. In Russian.

Complete starvation with adequate water intake for three days disclosed a general desynchronization of the electroencephalogram of the brain cortex in cats under urethane anesthesia. General increase in the cortex activation could be blocked by aminazine administration, but the drug had no effect on the digestive activation. Evidently, prolonged starvation causes a general stress on the organism which results in the general activation of brain cortex.

A66-81608

EFFECT OF CARBON DIOXIDE ON OXYGEN TENSION IN MYOCARDIUM [VLIYANIE UGLEKISLOTY NA NAPRIAZHENIE KISLORODA V MIOKARDE].

N. V. Sanotskaia (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Lab. of Physiol. and Pathol. Blood Circulation and Respiration, Moscow).

Fiziologicheskii Zhurnal SSSR, vol. 52, May 1966, p. 556-567. 17 refs. In Russian.

Breathing air containing 5-15% CO₂ caused in dogs an increase in oxygen tension and blood volume in myocardium. Concentration of 20-30% CO₂ in cats caused an initial rise followed by a fall below normal level. During hypocapnia resulting from hyperventilation, a decrease in these factors was noted. Breathing pure oxygen during extreme hyperventilation did not prevent the lowering of oxygen tension in myocardial tissues. The difference in results in cats and dogs may be due to species differences.

A66-81609

CERTAIN ASPECTS OF THE PRESSOR EFFECT OF ADRENALIN AND NORADRENALIN [NEKOTORYE ZAKONOMERNOSTI PRESSORNOGO DEISTVIA ADRENALINA I NORADRENALINA].

B. N. Manukhin (USSR, Acad. of Sci., A. N. Severtsov Inst. of Animal Morphol., Kh. S. Koshtoiants Lab. of Gen. and Comp. Physiol., Moscow).

Fiziologicheskii Zhurnal SSSR, vol. 52, May 1966, p. 575-581. 14 refs. In Russian.

Injections of catecholamines caused a pressor reaction in rabbits, which can be expressed by the formula, $p = P(A/MK + A)$, where p = pressor reaction, P_M = maximal reaction, K = apparent dissociation constant of catecholamine complex-adrenoreceptor-basic parameters, characteristic of adrenogenic effector system, and A = catecholamine concentration. Development of experimental renal hypertension was followed by changes in functional characteristic of specific adrenoreceptors, which are described by parameters of adrenergic reaction, P_M , K , and E . Simultaneous compensatory decrease of active noradrenaline concentration occurred. The analysis of the interaction of catecholamines and specific adrenoreceptors permits a quantitative appraisal of the functional state of the adrenergic effector system under various physiological conditions.

A66-81610

BEHAVIOR OF CARBON DIOXIDE AND OTHER VOLATILES ON MARS.

Robert B. Leighton and Bruce C. Murray (Calif. Inst. of Technol., Pasadena).

Science, vol. 153, Jul. 8, 1966, p. 136-144. 28 refs.

NASA Grants NsG-425 and NsG-56-60.

A rather simple model of the Martian surface, in combination with current observations of the atmospheric composition, points strongly toward the conclusion that the polar caps of

Mars consist almost entirely of frozen CO₂. This study was based upon several assumptions. Although in the main investigation certain specific values were used for the various relevant parameters, the effects of moderate changes in these quantities were tested. Specifically, the soil conductivity was varied by a factor of three, the albedo and emissivity of the surface were changed by 15 to 20% and the effects of a gross amount of atmospheric blanketing were studied. Only the last of these variations had any significant effect on the model, and other results of the atmospheric blanketing were in disagreement with other physical observations of the planet. Consequently, it is difficult to avoid the conclusion that CO₂ must condense in large amounts relative to H₂O.

A66-81611

RADIATION MEASUREMENTS IN COMMERCIAL AIRCRAFT USING A SINGLE COUNTER.

V. D. Hopper and W. R. Rawlinson (Melbourne U., Dept. of Phys. (R.A.A.F. Acad.), Australia).

Nature, vol. 210, Apr. 30, 1966, p. 473-475.

AF and Radio Res. Board supported research.

A single Geiger-Müller counter was used to measure cosmic-rays in flights of commercial aircraft: (1) count rate with the unshielded Geiger tube, (2) with the tube shielded by 2.12 g./cm.² of lead, and (3) radioactive sources of the aircraft itself. Source and degree of experimental errors are discussed; they may have come from statistical fluctuations or accuracy of instrument readings. Some radiation was registered from sources within the aircraft. Two processes involved in the increase in count rate with shielding are discussed, and the difference in radiation doses of cosmic rays and gamma-radiation is examined. The minimum count rate occurred at the geomagnetic equator with a slow increase to 10°, and a steep increase between 25° and 40°. Between 40° and 50° there was a sudden drop in the slope of the curve, and from 55° upwards the increase was very slow.

A66-81612

GROWTH HORMONE SECRETION IN RESPONSE TO STRESS IN MAN.

F. C. Greenwood (Lincoln's Inn Fields, Imp. Cancer Res. Fund, Div. of Chem. and Biochem., London, Great Britain) and J. Landon (St. Mary's Hosp. Dept. of Chem. Pathol., Metab. Unit, London, Great Britain).

Nature, vol. 210, Apr. 30, 1966, p. 540-541. 14 refs.

Stimulation of growth hormone secretion associated with adrenocortical activity occurred in response to emotional stress and to the injection of pyrogen. This was not associated with hypoglycemia. The plasma growth hormone response to pyrogen secretion was not suppressed by an induced hyperglycemia. Stimulation of cortisol secretion by lysine 8-vasopressin was accompanied by a rise in plasma growth hormone levels in women but not in men. Plasma sugar levels were unchanged in both men and women.

A66-81613

EFFECT OF MICROWAVE RADIATION ON BIRDS.

J. A. Tanner (Natl. Res. Council, Control Systems Lab., Div. of Mech. Eng., Ottawa, Canada).

Nature, vol. 210, May 7, 1966, p. 636. 6 refs.

Chickens subjected to microwave radiation in the range of 10-30 mW/cm.² at a frequency of 16,000 Mc/sec. and a pulse repetition rate of 8,000 pulses/sec. from a horn antenna placed over the head, showed after a few seconds of exposure, sustained extensor activity of a wing and a leg. This reaction was possibly due to the penetration of induced electrical activity to the spinal cord. Shielding of head or body produced no

change of effect. When the antenna was placed below the cage floor, no sign of muscular disturbance was noted, although chickens registered a startled reaction at the onset of radiation. Similar but less dramatic results were obtained with pigeons and sea gulls. Tests on the absorption characteristics of feathers produced negative results. It is suggested that low field intensity and short exposure precluded production of heat as the causal factor of the extensor effect.

A66-81614

LASER LESIONS: CHANGES IN RETINAL EXCITABILITY.

A. N. Nicholson and M. J. Allwood (Roy. AF Inst. of Aviation Med., Farnborough, Hants, Great Britain).

Nature, vol. 210, May 7, 1966, p. 637-638.

Experiments were carried out on anesthetized cats with enucleated right eye and fully dilated left eye. Electroretinograms were recorded by means of electrodes resting on the rim of the cornea. Responses to photic stimuli were recorded before and after lesions produced in the nasal part of the retina by a ruby laser beam of nominal output 0.5 J, and pulse duration of 0.5 msec. The lesions varied in diameter from 0.4 to 2.2 mm. When electroretinogram and optic tract potential were registered every 2 sec., the A and B waves were depressed immediately following the lesion. The A wave regained amplitude and the B wave, following initial recovery, declined over the following 50 min. The optic tract potential was reduced. In most cases potential made a partial recovery. When electrodes were placed in both optic tracts, the temporal optic tract potential showed either no change in 40 sec., or a temporary decrease. The spatial relationship between optic tract potentials and their retinal connections, and lesions are discussed. The permanent damage and temporary disorganization of the retino-optic mechanism is suggested.

A66-81615

A NEW METHOD OF MEASURING THE RESIDUAL VOLUME OF GAS IN THE HUMAN VENTILATORY SYSTEM [UNE NOUVELLE METHODE DE MESURE DE L'INERTANCE GAZEUSE DU SYSTEME VENTILATOIRE DE L'HOMME].

Pierre Varene, Jean Timbal, and Charles Jacquemin (Centre d'Essais en Vol., Lab. de Med. aerospatiale, Brétigny-sur-Orge, Essonne, France).

Comptes Rendus des Séances de l'Académie des Sciences, vol. 262, Mar. 14, 1966, p. 1270-1271. 5 refs. In French.

A method is described for the mathematical estimation of residual volume by whole body plethysmography during rapid breathing. Values obtained from four subjects at a ventilatory frequency of four hertz were at an average of $20 \cdot 10^{-3}$ cm./l. sec. -2.

A66-81616

MECHANISM OF ATTENUATION OF HYPOXIC HYPOXIA BY ADDITION OF CO₂ TO INSPIRED AIR [SUR LE MECANISME DE L'ATTENUATION DE L'HYPOXIE HYPOXIQUE PAR L'ENRICHISSEMENT EN CO₂ DE L'AIR INSPIRE].

Maurice-Vital Strumza (Fac. de Méd. de Paris, Lab. de Biol. aeron., France).

Comptes Rendus des Séances de l'Académie des Sciences, vol. 262, Apr. 18, 1966, p. 1740-1741. In French.

Five respiratory measurements were taken on 16 young adults while breathing hypoxic air to which nitrogen or carbon dioxide was added. Addition of carbon dioxide to inspired air attenuated respiratory difficulties inherent in moderate hypoxic hypoxia. In this condition, the alveolar oxygen partial pressure in the lungs was higher than for the same value of hypocapnic hypoxia.

A66-81617

HUNGER DURING TOTAL STARVATION.

J. Trevor Silverstone, John E. Stark, and Richard M. Buckle (St. Bartholomew's Hosp., London, Great Britain).

Lancet, vol. 1, Jun. 18, 1966, p. 1343-1344. 9 refs.

A questionnaire was used to make a quantitative assessment of the intensity of hunger recorded by nine obese patients on a regimen of total starvation. Hunger scores were computed on a 4-point scale, but there was no evidence that hunger diminished during starvation.

A66-81618

PLANETARY ENVIRONMENTS AND BIOLOGY.

Carl Sagan (Harvard U., Cambridge, Mass.)

Astronautics and Aeronautics, vol. 4, Jul. 1966, p. 12-22. 41 refs.

The author discusses the scientific information now available to man which can be utilized in formulating a theory of extraterrestrial life. The nature of living systems possible on planets in the solar system is examined. Topics discussed are: (1) planetary astronomy; (2) comparison of physical and biochemical processes connected with life on Earth and those which may exist on planets; (3) the presence of atmosphere, temperature, available energy, and solvent systems on planets; and (4) periodic variations of conditions observed on planets.

A66-81619

NUTRITION PROBLEMS IN COSMIC FLIGHT [PROBLEM ZYWIENIA W LOTACH KOSMICZNYCH].

Michał Jendyk (Wojskowy Inst. Med., Lodz, Poland).

Lekarz wojskowy, vol. 41, no. 4, 1965, p. 289-294. 11 refs. In Polish.

General nutritional requirements for the human organism are outlined and minimum requirements listed. Space flight requirements are summarized as referred to length of mission (22 months to Mars, 25 months to Venus, etc.). For extended flights, the introduction of bioregenerating systems is mandatory. The chemical characteristics and nutritional value of *Chlorella* are reviewed, and the regenerative capacity of a typical life support system is indicated (e.g., a system absorbing 1085 gr. CO₂ in 24 hours releases 875 gr. O₂ in the same length of time).

A66-81620

QUANTITATIVE CHANGES OF CERTAIN URINE CONSTITUENTS AFTER "LOOPING" MANEUVERS AND AT THE MOMENT OF SEAT EJECTION [ZMIANY ZAWARTOSCI NIEKTORYCH SKLADNIKOW MOCZU POD WPLYWEM CWICZEN NA LOOPINGU I PODCZAS KATAPULTOWANIA].

Michał Jendyk (Wojskowy Inst. Med., Lodz, Poland).

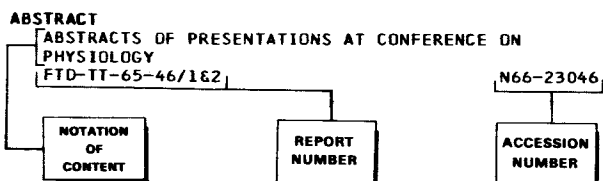
Lekarz wojskowy, vol. 41, no. 4, 1965, p. 735-744. In Polish.

Three groups of ten pilots carried out aerial maneuvers which comprised 45 loops, each lasting for about 90 seconds, during three consecutive days. Upon termination of the missions, urine samples were taken and analyzed. The findings were as follows: (1) increased number of red blood cells; (2) decrease of sodium and chlorides; (3) increase of potassium, creatinine, aminocatechole, lactic acid, and 17-ketosteroids; and (4) precipitation of urea. Further research on the biological and physiological mechanisms involved is recommended.

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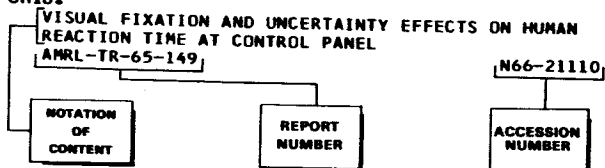
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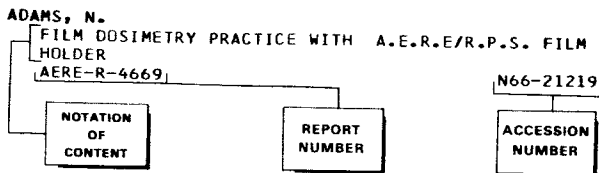
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